

Trends and Issues in Instructional Design and Technology

FIFTH EDITION

Edited by
**Robert A. Reiser,
Alison A. Carr-Chellman,
and John V. Dempsey**



TRENDS AND ISSUES IN INSTRUCTIONAL DESIGN AND TECHNOLOGY

Trends and Issues in Instructional Design and Technology provides current and future IDT professionals with a clear picture of current and future developments in the field that are likely to impact their careers and the organizations they work for. The fifth edition of this acclaimed, award-winning book has been designed to help instructional design and educational technology students, scholars, and practitioners to acquire the skills and knowledge essential to attaining their professional goals. In addition to the thorough and comprehensive updates made across the text, this revision adds 24 new chapters covering artificial intelligence, alternative ID models, social emotional learning, return on investment, micro-credentials and badging, designing for e-learning, hybrid learning, professional ethics, diversity and accessibility, and more.

By exploring the field's purpose and history, theories and models, emerging technologies and environments, and continual challenges and newfound concerns, this text provides an integral survey of the field's contemporary landscape.

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PREFACE

This book provides readers with a clear picture of the field of instructional design and technology (IDT). Many textbooks in the IDT field focus on the skills needed by instructional designers and technologists, often providing readers with step-by-step processes for doing instructional design. However, we believe that professionals in the field should be able to do more than just perform the skills associated with it. They should also be able to clearly describe the nature of the field, be familiar with the field's history and its current status, and be able to describe the trends and issues that have affected it and those that are likely to do so in the future. This book will help readers attain these goals.

ORGANIZATION OF THE BOOK

This book is organized into nine sections. The first section focuses on the **definition and history** of the IDT field. Some key terms in the field are defined, and a history of the field is presented.

The second section focuses on various **models of instructional design**. One chapter discusses the evolution of instructional design models and the characteristics of a number of those models. The other two chapters in this section describe two prominent models – David Merrill's First Principles model and Michael Allen's Successive Approximation model.

Section III focuses on various **theories and models of learning and instruction**. The section begins with a chapter that provides an overview of the various psychological concepts and principles of learning that are foundational to the field. This is followed by a series of chapters that describe constructivism, the learning sciences, motivational design, profound learning, systems theories, social-emotional learning, and problem-based and authentic learning.

Section IV centers on **evaluation and analytics**. The first chapter provides a comparison of several evaluation models often used in the field. The second chapter focuses on how to measure return on investment. And the third chapter discusses learning engineering, including learning analytics.

The fifth section of the book focuses on **performance improvement**. In addition to a chapter that provides an overview and history of performance improvement, there are chapters on informal learning and micro-credentials and badging.

Section VI describes **what IDT professionals do in a variety of work settings**. These settings include business and industry, the military, health care, K–12 schools, higher education, and various international settings.

Section VII focuses on **how to get an IDT position and succeed at it**. Several chapters focus on various career options for instructional designers, including working as an independent consultant. In addition, there is a chapter that discusses professional development opportunities in the field.

The eighth section focuses on **innovative tools and technologies**. This section includes examinations of hybrid campuses, e-learning tools, podcast design, uses of social media, potential uses of artificial intelligence (AI) for instructional designers, and game design.

The last section of the book addresses some of the **current issues in the IDT field**. Topics that are discussed include professional ethics, diversity and accessibility, changing conceptions of design, and future research directions for the field.

WHAT'S NEW IN THIS EDITION?

The fifth edition of this book differs from the fourth edition in several ways. One major difference is the inclusion of **24 new chapters in this edition**. Many of these chapters provide an in-depth look at topics that were either not covered, were just briefly touched upon, and/or were discussed by other authors in the fourth edition. These new chapters focus on:

- Characteristics of instructional design models (Chapter 3)
- First principles of instructional design (Chapter 4)
- Profound learning (Chapter 10)
- Systems theory (Chapter 11)
- Social emotional learning (Chapter 12)
- Authentic learning (Chapter 14)
- Return on investment (Chapter 16)
- Learning engineering (Chapter 17)
- Human performance technology (Chapter 18)
- Badges and micro-credentials (Chapter 20)
- Instructional design in business and industry (Chapter 21)
- Health care education (Chapter 23)
- K–12 education (Chapter 24)
- Higher education (Chapter 25)
- International perspectives (Chapter 26)
- Career options (Chapter 27)
- Professional development (Chapter 29)
- The hybrid campus (Chapter 31)
- Podcasts (Chapter 32)
- Artificial intelligence (Chapter 34)
- E-learning (Chapter 35)
- Professional ethics (Chapter 37)
- Diversity and accessibility (Chapter 38)
- The future of research in the field (Chapter 40)

In addition to these new chapters, **most of the other chapters have been extensively revised**. Moreover, in this edition we maintained for each chapter the **end-of-chapter summaries of key principles**. These summaries are designed to help students recall the key ideas expressed throughout each chapter.

The **case-based application questions** that appear at the end of each chapter should also be mentioned. These questions present students with authentic (“real world”) problems and require them to solve those problems. We have used these sorts of application questions in our classes for quite a few years, and our students have indicated that trying to solve them has really helped them to learn how to apply the key principles and practices associated with the various trends they are studying.

ACKNOWLEDGMENTS

This book would not have been possible without all the hard work done by the many individuals who have written chapters for it. As a group, they voluntarily spent many hundreds of hours putting together a series of chapters that provide readers with what we consider to be a very thoughtful overview of the field of instructional design and technology, and the many trends and issues that are affecting it. We would like to express our deepest thanks and sincere appreciation to all these authors for their outstanding efforts. We really believe they did an excellent job, and we are confident that after you read the chapters they wrote, you will feel the same way.

We would also like to express our sincere appreciation to Daniel Schwartz, our editor at Routledge. His help in putting together this manuscript has proved to be invaluable. We would also like to thank Kate Fornadel, the Senior Project Manager at Apex CoVantage, for the excellent work she did in coordinating the entire production process, and Elizabeth Ferguson, for her careful proofreading.



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INTRODUCTION

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Many of us who have been in the field of instructional design and technology for a while have had the experience of facing our parents and trying to explain our profession to them. Long explanations, short explanations – the end result is too often the same. Our parents nod and mumble something like, “That’s nice, dear,” or perhaps they ask what happened to our earlier ambitions to be teachers or lawyers or writers, something they understand more easily.

Think about your parents. How much do they understand about the field you are now studying, the field this book is about? They probably can’t describe it very well; perhaps when asked by their friends or your siblings what field you are in, they can’t even name it. But that puts them in some pretty good company. You may be surprised to learn that many professionals *in this field* also have trouble describing it. Indeed, many of them aren’t sure exactly what to call it – instructional technology, educational technology, instructional design, instructional development, instructional systems, or *instructional design and technology* (IDT), the name we, the editors of this book, have decided to use. Just what is the broad nature and contemporary issues that impact our field? This is the basic question that the authors of the chapters in this book have attempted to answer.

This volume grew from each of our experiences in teaching a “Trends and Issues” course at our respective universities (together we have a total of more than 70 years of experience teaching a course of this nature!). For many years we used an ever-changing collection of readings from a variety of sources. For all the differences between our three courses, there were greater similarities. As long-time colleagues and former students of one another, we have many times compared notes about our courses and the kind of text we would ideally like to have students read to get a clear understanding of the field.

We thought about and dispensed with the idea of preparing a book of reprints from journals in the field such as *Tech Trends* or *Educational Technology, Research & Development*. As our discussions evolved, we invited a number of the most talented individuals we know in the field to contribute original manuscripts. The volume you hold in your hands is the result of decades of work to continuously refine, update, and improve the coverage of the text for the field of instructional design and technology. The result is this book, *Trends and Issues in Instructional Design and Technology*.

The many talented authors and leaders in the field who have contributed to this book join us in the hope that by the time you finish reading it, you will have a clearer picture of the nature of the field of IDT and the trends and issues

that have affected it in the past, today, and in the future. If we succeed in our efforts, then you may be able to clearly describe our field to your parents or anyone else who will take the time to listen. Perhaps more importantly, you will launch yourself into a deep engagement with the trends and issues that give this unique field the character and interest that will sustain your career well into the future.

SECTION **I**

Definition and
History of the Field



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What Field Did You Say You Were In? Defining and Naming Our Field¹

Robert A. Reiser and Alison A. Carr-Chellman

What are the boundaries of the field we are in? How shall we define it? Indeed, what shall we call it? Although there isn't a generally accepted "correct" answer to these questions, you, as a future professional in our field, should be able to state your own answers to these questions and discuss those answers intelligently. This chapter is intended to provide you with information that should help you formulate some tentative answers to these questions – even an elevator speech about this field you are being trained in. The chapter will examine how the definition of the field has changed over the years, present some new definitions, and discuss the term that we will use in this book as the label for our field.

Before beginning to examine the definitions of our field, it is important to point out that not only have the definitions changed, but the actual name of the field itself has often varied over time and across different institutions. In the past, a variety of labels have been used, including such terms as audiovisual instruction and audiovisual communications. However, in the past 50 years the terms that have been used most frequently have been *educational technology* and *instructional technology*. The latter term will be used in the next few sections of this chapter. However, the issue of the proper name for the field will be revisited near the end of the chapter.

What is the field of instructional technology? This is a difficult question to answer because the field is constantly changing. New ideas and innovations affect the practices of individuals in the field, changing and often broadening the scope of their work. Moreover, as is the case with many professions, different individuals in the field focus their attention on different aspects of it,

1 We would like to thank Walter Dick, Kent Gustafson, and the late Don Ely for providing us with invaluable feedback on earlier versions of this manuscript, portions of which previously appeared in *Educational Technology Research and Development* (Reiser & Ely, 1997).

oftentimes thinking that the work they do is at the heart of the field, that their work is what instructional technology is “really all about”.

Over the years, there have been many attempts to define the field. Several such efforts have resulted in definitions that were accepted by a large number of professionals in the field, or at least by the professional organizations to which they belonged. However, even when a leading organization in the field has endorsed a particular definition, professionals in the field have operated from a wide variety of different personal, as well as institutional, perspectives. This has held true among intellectual leaders as well as practitioners. Thus, throughout the history of the field, the thinking and actions of a substantial number of professionals in the field have not been, and likely never will be, captured by a single definition.

EARLY DEFINITIONS: INSTRUCTIONAL TECHNOLOGY VIEWED AS MEDIA

Early definitions of the field of instructional technology focused on instructional media – the physical means via which instruction is presented to learners. The roots of the field have been traced back at least as far as the first decade of the twentieth century, when one of these media – educational film – was first being produced (Saettler, 1990). Beginning with this period, and extending through the 1920s, there was a marked increase in the use of visual materials (such as films, pictures, and lantern slides) in public schools. These activities were all part of what has become known as the *visual instruction* movement. Formal definitions of visual instruction focused on the media that were used to present that instruction. For example, one of the first textbooks on visual instruction defined it as “the enrichment of education through the ‘seeing experience’ [involving] the use of all types of visual aids such as the excursion, flat pictures, models, exhibits, charts, maps, graphs, stereographs, stereopticon slides, and motion pictures” (Dorris, 1928, p. 6).

During the late 1920s through the 1940s, as a result of advances in such media as sound recordings, radio broadcasting, and motion pictures with sound, the focus of the field shifted from visual instruction to audiovisual instruction. This interest in media continued through the 1950s with the growth of television. Thus, during the first half of the twentieth century, most of those individuals involved in the field that we now call instructional technology were focusing most of their attention on instructional media.

Today many individuals who view themselves as members of the instructional technology profession still focus much, if not all, of their attention on the design, production, and use of instructional media. Moreover, many individuals both within and outside the field of instructional technology equate the field with instructional media. Yet, although the view of instructional technology as media has persisted over the years, during the past 60 years other views of instructional technology have emerged and have been subscribed to by many professionals in the field.

1960S AND 1970S: INSTRUCTIONAL TECHNOLOGY VIEWED AS A PROCESS

Beginning in the 1950s, and particularly during the 1960s and 1970s, a number of leaders in the field of education started discussing instructional technology

in a different way – rather than equating it to media, they discussed it as being a process. For example, Finn (1960) suggested that instructional technology should be viewed as a way of looking at instructional problems and examining feasible solutions to those problems. And Lumsdaine (1964) indicated that educational technology could be thought of as the application of science to instructional practices. As you will see, most of the definitions of the 1960s and 1970s reflect this view of instructional technology as a process.

The 1963 Definition

In 1963, the first definition to be approved by a major professional organization within the field of educational technology was published, and it too indicated that the field was not simply about media. This definition (Ely, 1963), produced by a commission established by the Department of Audio-visual Instruction (DAVI), now known as the Association for Educational Communications and Technology (AECT), was a departure from the “traditional” view of the field in several important respects. First, rather than focusing on media, the definition focused on “the design and use of messages which control the learning process” (p. 38). Moreover, the definition statement identified a series of steps that individuals should undertake in designing and using such messages. These steps, which included planning, production, selection, utilization, and management, are similar to several of the major steps often associated with what has become known as systematic instructional design (more often simply referred to as instructional design). In addition, the definition statement placed an emphasis on *learning* rather than *instruction*. The differences identified here reflect how, at that time, some of the leaders in the field saw the nature of the field changing.

The 1970 Definitions

The changing nature of the field of instructional technology is even more apparent when you examine the next major definition statement, produced in 1970 by the Commission on Instructional Technology. The Commission was established and funded by the United States government in order to examine the potential benefits and problems associated with increased use of instructional technology in schools. The Commission’s report, titled *To Improve Learning* (Commission on Instructional Technology, 1970), provided *two* definitions of instructional technology. The first definition reflected the older view of the field:

In its more familiar sense, it [instructional technology] means the media born of the communications revolution which can be used for instructional purposes alongside the teacher, textbook, and blackboard. . . . The pieces that make up instructional technology [include]: television, films, overhead projectors, computers, and other items of “hardware” and “software.”

(p. 21)

In contrast to this definition, the Commission offered a second definition that described instructional technology as a process:

The second and less familiar definition of instructional technology goes beyond any particular medium or device. In this sense,

instructional technology is more than the sum of its parts. It is a systematic way of designing, carrying out, and evaluating the whole process of learning and teaching in terms of specific objectives, based on research on human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective instruction.

(p. 21)

Whereas the Commission's first definition reinforced media-based notions of the field, its second definition positioned the field differently, introducing a variety of concepts that had not appeared in previous "official" definitions of the field. It is particularly important to note that this definition mentions a "systematic" process that includes the specification of objectives and the design, implementation, and evaluation of instruction, each term representing one of the steps in the systematic instructional design procedures that were beginning to be discussed in the professional literature of the field (e.g., Finn, 1960; Gagné, 1965; Hoban, 1977; Lumsdaine, 1964; Scriven, 1967). The definition also indicates that the field is based on research and that the goal of the field is to bring about more effective learning, echoing the 1963 emphasis on this concept. Finally, the definition discusses the use of both non-human *and* human resources for instructional purposes, seemingly downplaying the role of media.

The 1977 AECT Definition

Over the years, the Association for Educational Communication and Technology (AECT), which has remained as one of the major professional associations in the field, has produced several definitions of instructional technology. The first major revision of their 1963 definition was published in 1977 (Association for Educational Communications and Technology, 1977) and differed from the previous definitions in several ways. One of the most noteworthy was its length – it consisted of 16 statements spread over 7 pages of text, followed by 9 pages of tables elaborating on some of the concepts mentioned in the statements, as well as nine more chapters (more than 120 pages) that provided further elaboration. Although the authors clearly indicated that no one portion of the definition was adequate by itself, and that the 16 parts were to be taken as a whole, the first sentence of the definition statement provides a sense of its breadth:

Educational technology is a complex, integrated process involving people, procedures, ideas, devices, and organization, for analyzing problems and devising, implementing, evaluating, and managing solutions to those problems, involved in all aspects of human learning.

(p. 1)

Much like the second 1970 definition put forth by the Commission, the 1977 definition placed a good deal of emphasis on a systematic ("complex, integrated") design process; the various parts of the definition mentioned many of the steps in most current-day systematic design processes (e.g., design, production, implementation, and evaluation). It is particularly interesting to note that the 1977 definition statement was the first such statement to mention the analysis phase of the planning process, which at that time was beginning to receive increasing attention among professionals in the field.

The 1977 definition also broke new ground by incorporating other terminology that, within a period of a few years, was to become commonplace in the profession. For example, the definition included the terms human learning problems and solutions, foreshadowing the frequent current-day use of these terms.

The 1977 definition also included detailed tables describing the various learning resources associated with the field. This list gave equal emphasis to people, materials and devices, reinforcing the notion that the work of instructional technologists was not limited to the development and use of media.

DEFINITIONS FROM THE 1990S TO THE PRESENT

The 1994 AECT Definition

During the period from 1977 to the mid-1990s, many developments affected the field of instructional technology.² Whereas behavioral learning theory had previously served as the basis for many of the instructional design practices employed by those in the field, cognitive and constructivist learning theories began to have a major influence on design practices. The profession was also greatly influenced by technological advances such as the microcomputer, interactive video, CD-ROM, and the Internet. The vast expansion of communications technologies led to burgeoning interest in distance learning, and “new” instructional strategies such as collaborative learning gained in popularity. As a result of these and many other influences, by the mid-1990s the field of instructional technology was very different from what it was in 1977, when the previous definition had been published. Thus, it was time to redefine the field.

Work on a new definition officially commenced in 1990 and continued until 1994, when AECT published *Instructional Technology: The Definitions and Domains of the Field* (Seels & Richey, 1994). This book contains a detailed description of the field, as well as the following concise definition statement:

Instructional Technology is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning.

(p. 1)

As is evident in the definition, the field is described in terms of five domains – design, development, utilization, management, and evaluation – five areas of study and practice within the field. The inter-relationship between these domains can be understood as a wheel, with each domain on the perimeter connected to a “theory and practice” hub. Based on this understanding, readers can be kept from the erroneous conclusion that these domains are linearly related (Richey & Seels, 1994). Unlike the second 1970 definition and the 1977 AECT definition, the 1994 definition does not describe the field as process-oriented. In fact, the authors of the 1994 definition state they purposely excluded the word “systematic” in their definition so as to reflect current interests in alternative design methodologies, such as constructivist approaches (Richey & Seels, 1994). Nonetheless, the five domains that are identified in the definition are very similar to the steps that comprise the “systematic” processes described in the

² Many of these developments are discussed in detail in Chapter 2 of this book.

previous two definitions. Indeed, each of the five terms (design, development, utilization, management, and evaluation) or a synonym is used directly or indirectly in one or both of the previous two definitions.

The 1994 definition statement moves in some other new directions and revisits some old ones. For example, much like the 1963 definition statement, the 1994 statement describes the field in terms of theory and practice, emphasizing the notion that the field of instructional technology is not only an area of practice but also an area of research and study. The documents in which the 1970 and 1977 statements appear also discuss theory and practice, but the statements themselves do not mention these terms.

In at least two respects the 1994 definition is similar to its two most recent predecessors. First, it does not separate teachers from media, incorporating both into the phrase “resources for learning”. And second, it focuses on the improvement of learning as the goal of the field, with instruction being viewed as a *means* to that end.

Although the 1994 definition discusses instruction as a means to an end, a good deal of attention is devoted to instructional processes. The authors indicate that the “processes . . . for learning” (Seels & Richey, 1994, p. 1) mentioned in their definition refer to both design and delivery processes. Their discussion of the latter revolves around a variety of instructional strategies and reflects the profession’s current interest in a wide variety of instructional techniques, ranging from traditional lecture/discussion approaches to open-ended learning environments.

The 2007 AECT Definition

In 2007, an AECT committee produced a book that presented a new definition of the field of educational technology (Januszewski & Molenda, 2007). The definition statement that appears in the book is as follows:

Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources.

(p. 1)

One of the many useful features of the book is a series of chapters devoted to explaining each of the key terms in the definition statement and discussing how the new definition differs from previous ones. Some of the key terms that the authors discuss in the chapter are described next.

One key term in the new definition is the word *ethical*. This term focuses attention on the fact that professionals in the field must maintain a high level of professional conduct. Many of the ethical standards professionals in the field are expected to adhere to are described in the AECT Code of Ethics (Association for Educational Communications and Technology, 2018).

The new definition also focuses on the notion that the instructional interventions created by professionals in field are intended to *facilitate* learning. The authors contrast this viewpoint with those expressed in earlier definitions, in which it was stated or implied that the instructional solutions that were produced would *cause* or *control* learning. The new perspective recognizes the important role that learners play in determining what they will learn, regardless of the instructional intervention they are exposed to.

The new definition also indicates that one of the goals of professionals in the field is to *improve performance*. The authors indicate that this term emphasizes that it is not sufficient to simply help learners acquire inert knowledge. Instead, the goal should be to help learners *apply* the new skills and knowledge they have acquired.

Unlike previous definitions, in which terms such as design, development, and evaluation were often used to denote major processes or domains within the field, the new definition uses the terms *creating*, *using*, and *managing* to describe the major functions performed by educational technology professionals. The *creation* function includes all of the steps involved in the generation of instructional interventions and learning environments, including analysis, design, development, implementation, and evaluation. The *utilization* function includes the selection, diffusion, and institutionalization of instructional methods and materials, and the *management* function incorporates project, delivery system, personnel, and information management. The authors point out that these three less technical terms are used to describe the major functions so as to convey a broader view of the processes used within the field.

The definition also uses the adjective *technological* to describe the types of processes professionals in the field engage in and the type of resources they often produce. The authors, drawing on the work of Galbraith (1967), indicate that technological processes are those that involve “the systematic application of scientific or other organized knowledge to accomplish practical tasks” (Januszewski & Molenda, 2007, p. 12). The authors also indicate that technological resources refer to the hardware and software that is typically associated with the field, including such items as still pictures, videos, computer programs, DVD players, and so on.

The 2017 AECT Definition

In 2017, the AECT Definition and Terminology Committee created a new definition of the field:

Educational technology is the study and ethical application of theory, research, and best practices to advance knowledge as well as mediate and improve learning and performance through the strategic design, management and implementation of learning and instructional processes and resources.

(Hastings & Bauman, 2020)

There are several aspects of this definition that differ from the 2007 definition and that are worth noting. For example, the 2017 definition focuses on *research and theory* as a basis for *advancing knowledge* in the field, as well as influencing practices within the field. In addition, *best practices*, apparently derived from examination of previous successes, are described as a source that affects current practices. The definition also indicates that the processes and resources employed in the field may *mediate* learning and performance. This seems to be an acknowledgment of the fact that efforts to improve learning and performance don’t guarantee that such improvements will occur, that the effects of such efforts are mediated (i.e., influenced by) the learners’ efforts.

The 2017 definition also added some terminology that had appeared in earlier definitions but had been replaced by alternate wording in the 2007 definition. In particular, whereas the 2007 definition indicated that the field involved *creating, using, and managing* processes and resources, the 2017 definition indicated that it involved the *design, management, and implementation* of processes and resources. The use of the terms *design* and *implementation* harken back to earlier definitions of the field that incorporated the various stages of the ADDIE (analysis, design, development, implementation, and evaluation) models of instructional design, a model still used by many professionals in the field. The addition of the term *strategic* is also important, as it apparently indicates that the various steps in the instructional design process are not conducted in a lock-step fashion; instead, they are applied in carefully planned manner.

The 2023 AECT Definition

The most recent AECT definition of the field, which was approved by the association in 2023, states:

Educational technology is the ethical study and application of theory, research, and practices to advance knowledge, improve learning and performance, and empower learners through strategic design, management, implementation, and evaluation of learning experiences and environments using appropriate processes and resources.

This definition incorporates several of the key concepts expressed in the 2017 AECT definition but differs from it in several noteworthy ways. For example, it includes the *evaluation* of learning experiences and environments as one of the major foci of the field. The inclusion of this term, which was last used in an AECT definition in 1994, is significant given that evaluation has historically been considered a major step in the instructional design process (cf. Chapters 2 and 3). It is also worth noting that the new definition indicates that in addition to trying to improve learning and performance, an important goal is to *empower learners*. As the committee that created the new definition has indicated, the incorporation of this term into the definition aligns it with current thinking regarding the importance of learner-centered pedagogies and learner agency (cf. Chapter 6). In addition, the 2023 definition differs from the 2017 definition, as well as the three preceding ones, with regard to what is being created (the term used in 2007) or designed (the term used in 1994, 2007, and 2017). The earlier definitions indicated that learning processes and resources were what was being designed. In contrast, the 2023 definition indicates that what is being designed are *learning experiences and environments*. These two terms are intended to capture the wide variety of outputs, instructional and non-instructional, that professionals in the field are designing.

The Definition Used in This Textbook

The definition of our field that we will use in this textbook is the following:

The field of instructional design and technology (also known as instructional or educational technology) encompasses the analysis

of learning and performance problems, and the design, development, implementation, evaluation, and management of instructional and non-instructional processes and resources intended to improve learning and performance in a variety of settings, particularly educational institutions and the workplace.

Professionals in the field of instructional design and technology often use systematic instructional design procedures and employ instructional media to accomplish their goals. Moreover, in recent years they have paid increasing attention to non-instructional solutions to some performance problems. Research and theory related to each of the aforementioned areas is also an important part of the field.

This definition highlights two sets of practices – the use of media for instructional purposes and the use of systematic instructional design procedures (often simply called *instructional design*) – that have, over the years, formed the core of the field. We believe that these two practices are the key defining elements of the field of instructional design and technology. Individuals involved in the field are those who spend a significant portion of their time working with media and/or with tasks associated with systematic instructional design procedures. We believe that one of the strengths of this definition is the prominent recognition it gives to both aspects of the field. In addition, this definition highlights the fact that in recent years many professionals in the field of instructional design and technology have been focusing their efforts on improving human performance as well as learning, and that they often do so through the use of *non-instructional solutions* (i.e., solutions other than training courses and/or training materials). Numerous examples of non-instructional solutions to performance problems are described in other chapters in this book, including, but not limited to, the chapters on human performance improvement (Chapter 18), profound learning (Chapter 10), informal learning (Chapter 19), social media (Chapter 33), artificial intelligence (Chapter 34), and gaming (Chapter 36). Because we believe that this emphasis on improving human performance and learning via non-instructional, as well as instructional, means is a very important aspect of our field, we have included it in our definition.

NAMING THE FIELD: WHAT SHALL WE CALL IT?

The definition proposed in this chapter differs from most of the previous definitions in that it refers to the field as *instructional design and technology*, rather than *instructional technology* or *educational technology*. Why? Because most individuals outside of our profession, as well as many inside of it, when asked to define the term *educational technology* or *instructional technology*, will mention computers, mobile devices, and the other types of hardware and software typically associated with the term *instructional media*. In other words, most individuals will equate the terms *educational technology* and *instructional technology* with the term *instructional media*. This is the case even though all of the broadened definitions of instructional and educational technology that have appeared over the past 60 years have indicated that the term “technology” includes processes or approaches. In light of this fact, perhaps it is time to reconsider the label we use for the field. Any of a number of terms come to mind, but one that seems particularly appropriate is *instructional design and technology*. This term, which

has also been employed by one of the professional organizations in our field (Professors of Instructional Design and Technology), mentions both of the areas focused upon in earlier definitions: instructional design and media. Performance improvement, one of the other recent areas to have a major impact on the field, is not directly mentioned because adding it to the term *instructional design and technology* would make that term unwieldy, and because in recent years instructional design practices have broadened so that many of the concepts associated with the performance improvement movement are now regularly employed by those individuals who call themselves instructional designers.

It is worth noting that while most of the definitions of the field use instructional technology or educational technology as the title for the field, the term *learning* is gaining increased prominence. For example, several academic programs in the field are offering graduate degrees in *Learning Design and Technology* (cf. Arizona State University, Purdue University, Wayne State University). In addition, in the past several years the term *learning* has been used as part of the title for some new career fields whose practices overlap to some degree with the practices that have long been associated with the fields of instructional technology and educational technology. These newer fields include *learning engineering* and *learning experience design* (cf. Chapters 17 and 40).

In this book, our field will be referred to as *instructional design and technology*, and we will define this term as indicated earlier. However, regardless of the term that is used as the label for our field and the specific definition you prefer, it is important that you understand the ideas and practices that are associated with the field and the trends and issues that are likely to affect it. The purpose of this book is to introduce you to many of those ideas, practices, trends, and issues through clear, concise, and accessible chapters that describe the areas that make up the field. As you proceed through this book, we anticipate that your view of the field will evolve, and we are confident that your understanding of the field will increase. Moreover, we expect that you will be able to add your reasoned opinion to the ongoing debate concerning the “proper” definition and label for the field we have called instructional design and technology.

Summary of Key Principles

1. Over the years, a variety of different labels have been used as the name for the field that in this book we refer to as *instructional design and technology*. In recent years, other frequently used names for the field have included *instructional technology*, *educational technology*, and *learning design and technology*.
2. Definitions of the field have also changed over the years. Changes in definitions are appropriate because as new ideas and innovations affect the practices of individuals in the field, definitions of the field should be revised so as to recognize new theories and evolving practices.
3. Whereas early definitions of the field focused on the instructional media that were being produced by professionals in the field, starting in the 1960s and 1970s a number of leaders in the field, working both as individuals and as members of professional committees, developed definitions which indicated that instructional (or educational) technology was a process. In particular,

- a process for systematically designing instruction.
4. The goals specified in the various definition statements have also shifted over the years. Whereas the earlier definitions indicated that the goal of the field was to bring about more effective instruction, later definitions indicated that the primary goal was to improve learning. The most recent definition statements expanded this aim, indicating that the goal of the field is to improve, or facilitate, learning *and* performance.
 5. The definition of the field that we are using in this book focuses on the systematic design of instruction and the use of media for instructional purposes, the two sets of practices that have formed, and still do form, the foundation of our field. The definition also focuses on the efforts by many professionals in our field to use a variety of instructional *and* non-instructional means to improve human performance.

Application Questions

1. **Define the field:** Re-examine the various definitions of the field that have been mentioned in this chapter, as well as several other definitions that you find online and/or in other sources. Then prepare your own definition of the field. This definition may be one you create, one that was taken verbatim from this chapter or elsewhere, or one that is a modified version of an existing definition. In any case, be sure to reference the sources you used in preparing your definition. After you prepare your definition, describe why you feel it is a good one and how your own practice may influence your definition.
2. **Name the field:** As mentioned in this chapter, there are many labels for the field you are now studying. These labels include *educational technology*, *instructional technology*, *instructional design and technology*, *learning design and technology*, *instructional systems*, *instructional design*, *performance improvement*, and many others. Examine some outside resources in which several of these labels are defined and discussed. Then identify which label you feel is the best one for the field and describe why you feel that way.

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A History of Instructional Design and Technology

Robert A. Reiser

As was indicated in the first chapter of this book, over the years, two practices – the use of systematic instructional design procedures (often simply called *instructional design*) and the use of media for instructional purposes – have formed the core of the field of instructional design and technology. This chapter will review the history of the field by examining the history of instructional media and the history of instructional design. From a historical perspective, most of the practices related to instructional media have occurred independent of developments associated with instructional design. Therefore, the history of each of these two sets of practices will be described separately. It should also be noted that although many important events in the history of the field of instructional design and technology have taken place in other countries, the emphasis in this chapter will be on events that have taken place in the United States.

HISTORY OF INSTRUCTIONAL MEDIA

The term *instructional media* has been defined as the physical means via which instruction is presented to learners (Reiser & Gagné, 1983). Under this definition, every physical means of instructional delivery, from the live instructor to the textbook to the computer and so on, would be classified as an instructional medium. It may be wise for practitioners in the field to adopt this viewpoint; however, in most discussions of the history of instructional media, the three primary means of instruction prior to, and during most of, the twentieth century – the teacher, the chalkboard/whiteboard, and the textbook – have been categorized separately from other media (cf. Commission on Instructional Technology, 1970). In order to clearly describe the history of media, this viewpoint will be employed in this chapter. Thus, instructional media will be defined as the physical means, other than the teacher, chalkboard/whiteboard, and textbook, via which instruction is presented to learners.

School Museums

In the United States, the use of media for instructional purposes has been traced back to at least as early as the first decade of the twentieth century (Saettler, 1990). It was at that time that school museums came into existence. As Saettler (1968) has indicated, these museums “served as the central administrative unit[s] for visual instruction by [their] distribution of portable museum exhibits, stereographs [three-dimensional photographs], slides, films, study prints, charts, and other instructional materials” (p. 89). The first school museum was opened in St. Louis in 1905, and shortly thereafter school museums were opened in Reading, Pennsylvania, and Cleveland, Ohio. Although few such museums have been established since the early 1900s, the district-wide media center may be considered a modern-day equivalent.

Saettler (1990) has also stated that the materials housed in school museums were viewed as supplementary curriculum materials. They were not intended to supplant the teacher or the textbook. Throughout the past one hundred years, this early view of the role of instructional media has remained prevalent in the educational community at large. That is, during this time period most educators have viewed instructional media as a supplementary means of presenting instruction. In contrast, teachers and textbooks are generally viewed as the primary means of presenting instruction, and teachers are usually given the authority to decide what other instructional media they will employ. Over the years, a number of professionals in the field of instructional design and technology (e.g., Heinich, 1970) have argued against this notion, indicating that (a) teachers should be viewed on an equal footing with instructional media – as just one of many possible means of presenting instruction; and (b) teachers should not be given sole authority for deciding what instructional media will be employed in classrooms. However, in the broad educational community, these viewpoints have not prevailed.

The Visual Instruction Movement and Instructional Films

As Saettler (1990) has indicated, in the early part of the twentieth century, most of the media housed in school museums were visual media, such as films, slides, and photographs. Thus, at the time, the increasing interest in using media in the school was referred to as the “visual instruction” or “visual education” movement. The latter term was used at least as far back as 1908, when the Keystone View Company published *Visual Education*, a teacher’s guide to lantern slides and stereographs.

Besides magic lanterns (lantern slide projectors) and stereopticons (stereograph viewers), which were used in some schools during the second half of the nineteenth century (Anderson, 1962), the motion picture projector was one of the first media devices used in schools. In the United States, the first catalog of instructional films was published in 1910. Later that year, the public school system of Rochester, New York, became the first to adopt films for regular instructional use. In 1913, Thomas Edison proclaimed: “Books will soon be obsolete in the schools. . . . It is possible to teach every branch of human knowledge with the motion picture. Our school system will be completely changed in the next ten years” (cited in Saettler, 1968, p. 98).

During the ten-year period Edison was referring to (1914–1923), the visual instruction movement did grow. Five national professional organizations for visual instruction were established, five journals focusing on visual instruction began publication, more than twenty teacher-training institutions began offering courses in visual instruction, and at least a dozen large-city school systems developed bureaus of visual education (Saettler, 1990). However, by the end of that ten-year period, the revolutionary changes in education envisioned by Edison had not come about. Cuban (1986) indicates that the impact of the visual instruction was limited because of a wide variety of factors, including teacher resistance to change, the difficulty teachers had in operating film equipment, the paucity and poor instructional quality of relevant films in many subject areas, and the costs associated with purchasing and maintaining films and equipment.

The Audiovisual Instruction Movement and Instructional Radio

During the remainder of the 1920s and through much of the 1930s, technological advances in such areas as radio broadcasting, sound recordings, and sound motion pictures led to increased interest in instructional media. With the advent of media incorporating sound, the visual instruction movement became known as the audiovisual instruction movement (Finn, 1972; McCluskey, 1981). However, McCluskey (1981), who was one of the leaders in the field during this period, indicates that while the field continued to grow, the educational community at large was not greatly affected by that growth. He states that by 1930, commercial interests in the visual instruction movement had invested and lost more than \$50 million, only part of which was due to the Great Depression, which began in 1929.

In spite of the adverse economic effects of the Great Depression, the audiovisual instruction movement continued to evolve. According to Saettler (1990), one of the most significant events in this evolution was the merging, in 1932, of the three existing national professional organizations for visual instruction. As a result of this merger, leadership in the movement was consolidated within one organization, the Department of Visual Instruction (DVI), which at that time was part of the National Education Association. Over the years, this organization, which was created in 1923 and which is now called the Association for Educational Communications and Technology (AECT), has maintained a leadership role in the field of instructional design and technology.

During the 1920s and 1930s, a number of textbooks on the topic of visual instruction were written. Perhaps the most important of these textbooks was *Visualizing the Curriculum*, written by Charles F. Hoban et al. (1937). In this book, the authors stated that the value of audiovisual material was a function of their degree of realism. The authors also presented a hierarchy of media, ranging from those that could only present concepts in an abstract fashion to those that allowed for very concrete representations (Heinich et al., 1999). Some of these ideas had previously been discussed by others, but they had not been dealt with as thoroughly. In 1946, Edgar Dale further elaborated upon these ideas when he developed his famous “Cone of Experience.” Throughout the history of the audiovisual instruction movement, many have indicated that part of the value of audiovisual materials is their ability to present concepts in a concrete manner (Saettler, 1990).

A medium that gained a great deal of attention during this period was radio. By the early 1930s, many audiovisual enthusiasts were hailing radio as the medium that would revolutionize education. For example, in referring to the instructional potential of radio, films, and television, the editor of publications for the National Education Association stated that “tomorrow they will be as common as the book and powerful in their effect on learning and teaching” (Morgan, 1932, p. ix). However, contrary to these sorts of predictions, over the next twenty years radio had very little impact on instructional practices. Cuban (1986) indicates that poor equipment, poor reception of radio signals, scheduling problems, and teacher resistance to change were among the many factors that resulted in this lack of impact.

World War II

With the onset of World War II, the growth of the audiovisual instruction movement in the schools slowed; however, audiovisual devices were used extensively in the military services and in industry. For example, during the war the United States Army Air Force produced more than 400 training films and over 600 training filmstrips, and it was estimated that from mid-1943 to mid-1945 there were over four million showings of training films to United States military personnel. Although there was little time and opportunity to collect hard data regarding the effect of these films on the performance of military personnel, several surveys of military instructors revealed that they felt the training films and filmstrips used during the war were effective training tools (Saettler, 1990). Apparently, at least some of the enemy agreed; in 1945, after the war ended, the German Chief of General Staff said: “We had everything calculated perfectly except the speed with which America was able to train its people. Our major miscalculation was in underestimating their quick and complete mastery of film education” (cited in Olsen & Bass, 1982, p. 33).

During the war, training films also played an important role in preparing civilians in the United States to work in industry. From 1941 to 1945, the recently established Division of Visual Aids for War Training oversaw the production of 457 training films that were designed for this purpose. Most training directors reported that the films reduced training time without having a negative impact on training effectiveness and that the films were more interesting and resulted in less absenteeism than traditional training programs (Saettler, 1990).

In addition to training films and film projectors, a wide variety of other audiovisual materials and equipment were employed in the military forces and in industry during World War II. Those devices that were used extensively included overhead projectors, which were first produced during the war; slide projectors, which were used in teaching aircraft and ship recognition; audio equipment, which was used in teaching foreign languages; and simulators and training devices, which were employed in flight training (Olsen & Bass, 1982; Saettler, 1990).

Theories of Communication

During the decade after World War II, many leaders in the audiovisual instruction movement became interested in various theories or models of communication, such as the model put forth by Shannon and Weaver (1949). These models focused on the communication process, a process involving a sender

and a receiver of a message, and a channel, or medium, through which that message is sent. The authors of these models indicated that during planning for communication it was necessary to consider all the elements of the communication process and not just focus on the medium, as many in the audiovisual field tended to do. As Berlo (1963) stated: "As a communication man I must argue strongly that it is the process that is central and that the media, though important, are secondary" (p. 378). Several leaders in the audiovisual movement, such as Dale (1953) and Finn (1954), also emphasized the importance of the communication process. Although at first audiovisual practitioners were not greatly influenced by this notion (Lumsdaine, 1964; Meierhenry, 1980), the expression of this point of view eventually helped expand the focus of the audiovisual movement (Ely, 1963, 1970; Silber, 1981).

Instructional Television

Perhaps the most important factor to affect the audiovisual movement in the 1950s was the increased interest in television as a medium for delivering instruction. Prior to the 1950s, there had been a number of instances in which television had been used for instructional purposes (Gumpert, 1967; Taylor, 1967). During the 1950s, however, there was tremendous growth in the use of instructional television. This growth was stimulated by at least two major factors.

One factor that spurred the growth of instructional television was the 1952 decision by the Federal Communications Commission to set aside 242 television channels for educational purposes. This decision led to the rapid development of a large number of public (then called "educational") television stations. By 1955, there were seventeen such stations in the United States, and by 1960 that number had increased to more than fifty (Blakely, 1979). One of the primary missions of these stations was the presentation of instructional programs. As Hezel (1980) indicates: "The teaching role has been ascribed to public broadcasting since its origins. Especially prior to the 1960s, educational broadcasting was seen as a quick, efficient, inexpensive means of satisfying the nation's instructional needs" (p. 173).

The growth of instructional television during the 1950s was also stimulated by funding provided by the Ford Foundation. It has been estimated that during the 1950s and 1960s the foundation and its agencies spent more than \$170 million on educational television (Gordon, 1970). Those projects sponsored by the foundation included a closed-circuit television system that was used to deliver instruction in all major subject areas at all grade levels throughout the school system in Washington County (Hagerstown), Maryland; a junior-college curriculum which was presented via public television in Chicago; a large-scale experimental research program designed to assess the effectiveness of a series of college courses taught via closed circuit television at Pennsylvania State University; and the Midwest Program on Airborne Television Instruction, a program designed to simultaneously transmit televised lessons from an airplane to schools in six states.

By the mid-1960s, much of the interest in using television for instructional purposes had abated. Many of the instructional television projects developed during this period had short lives. For example, by 1963 the Ford Foundation decided to focus its support on public television in general, rather than

on in-school applications of instructional television (Blakely, 1979). In addition, many school districts discontinued instructional television demonstration projects when the external funding for those projects was halted (Tyler, 1975b). Moreover, instructional programming was still an important part of the mission of public television, but that mission was now wider, encompassing other types of programming, such as cultural and informational presentations (Hezel, 1980). In light of these and other developments, in 1967 the Carnegie Commission on Educational Television concluded:

The role played in formal education by instructional television has been on the whole a small one . . . nothing which approached the true potential of instructional television has been realized in practice. . . . With minor exceptions, the total disappearance of instructional television would leave the educational system fundamentally unchanged.
(pp. 80–81)

Many reasons have been given as to why instructional television was not adopted to a greater extent. These include teacher resistance to change, especially *top-down change* (change mandated by school administrators with little or no input from teachers), the mediocre instructional quality of many of the television programs (many of them did little more than present a teacher delivering a lecture), the expense of installing and maintaining television systems in schools, and the failure to provide teachers with adequate guidance as to how to integrate the use of instructional television into their instructional practices (Chu & Schramm, 1975; Cuban, 1986; Gordon, 1970; Tyler, 1975b).

Using Computers for Instructional Purposes

After the interest in instructional television faded, the next technological innovation to catch the attention of a large number of educators was the computer. Although widespread interest in the computer as an instructional tool did not occur until the 1980s, computers were first used in education and training at a much earlier date. Much of the early work in computer-assisted instruction (CAI) was done in the 1950s by researchers at IBM, who developed the first CAI author language and designed one of the first CAI programs to be used in public schools. Other pioneers in this area included Gordon Pask, whose adaptive teaching machines made use of computer technology (Lewis & Pask, 1965; Pask, 1960; Stolorow & Davis, 1965), and Richard Atkinson and Patrick Suppes, whose work during the 1960s led to some of the earliest applications of CAI at both the public school and university levels (Atkinson & Hansen, 1966; Suppes & Macken, 1978). Other major efforts during the 1960s and early 1970s included the development of CAI systems such as PLATO and TICCIT. However, in spite of the work that had been done, by the end of the 1970s CAI had disappointingly little impact on education (Pagliaro, 1983).

By the early 1980s, a few years after personal computers became available to the general public, the enthusiasm surrounding this tool led to increasing interest in using computers for instructional purposes. By January 1983, computers were being used for instructional purposes in more than 40% of all elementary schools and more than 75% of all secondary schools in the United States (Center for Social Organization of Schools, 1983).

Many educators became attracted to personal computers as an instructional tool because they were relatively inexpensive, were compact enough for desktop use, and could perform many of the functions performed by the large computers that had preceded them. As was the case when other new media were first introduced into the instructional arena, many expected that this medium would have a major impact on instructional practices. For example, in 1984, Papert predicted that the computer was going to be “a catalyst of very deep and radical change in the educational system” (p. 422) and that by 1990 one computer per child would be a very common state of affairs in schools in the United States.

At first, optimistic predictions about the extent to which computers would transform instructional practices appeared to be wrong. By the mid-1990s that impact had been rather small. Surveys revealed that by 1995, although schools in the United States possessed, on average, one computer for every nine students, the impact of computers on instructional practices was minimal, with a substantial number of teachers reporting little or no use of computers for instructional purposes. Moreover, in most cases, the use of computers was far from innovative. In elementary schools, teachers reported that computers were being primarily used for drill and practice, and at the secondary level computers were mainly used for teaching computer-related skills such as word processing (Anderson & Ronnkqvist, 1999; Becker, 1998; Office of Technology Assessment, 1995). However, as discussed next, during the first quarter of the twenty-first century computers and other new technologies have had more of an impact on education and training than many of the media that preceded these innovations.

Recent Developments

During the past twenty-five years, rapid advances in computers and other digital technology have led to a rapidly increasing interest in, and use of, these media for instructional purposes. This conclusion appears to be true across a wide variety of training and educational settings, including business and industry, higher education, and K–12 education. One of the largest areas of growth has involved the use of online instruction in all of the aforementioned settings (Chapter 35). For example, in higher education the percentage of students taking online courses has dramatically increased. In 2012, approximately 26% of the students enrolled in institutions of higher learning were taking at least one online course (Seaman et al., 2018), whereas by 2021 more than 55% of such students were doing so (National Center for Education Statistics, 2023). In recent years, in business and industry, there has also been a significant increase in the use of online instruction; in 2014, approximately 29% of instruction in business and industry was online, whereas in 2021 more than 55% of instruction in was presented in this manner (ATD, 2022).

As noted in other chapters in this book, other technological advances also have had a major effect on learning and instruction. One of the most recent advances, and one likely to have an enormous impact, has been in the area of artificial intelligence (Chapter 34). Tools such as ChatGPT, Gradescope, and Fetchy are being used for such tasks as creating interesting lessons, assessing student work, providing feedback to students, and individualizing instruction. Game-based learning (Chapter 36) also is being frequently used

to support learning, not just through having students *play* games but also by having students *create* their own games. The use of augmented and virtual reality has also had a large impact, with these tools being used to provide students with learning experiences much like that which they might encounter in the real world. The use of social media (Chapter 33) has, among other things, enhanced learners' and educators' ability to find and evaluate resources, share knowledge and skills, and create and share their own learning resources. And the use of mobile learning has greatly enhanced the ability to provide instruction and support learning outside of the classroom environment.

In sum, most of the evidence presented in this section of this chapter clearly indicates that in recent years there has been a significant increase in the use of instructional media in a variety of settings. While some might feel that much of this increase is due to the "bandwagon effect" (employing a new technology simply because many others are doing so), in fact the instructional and learning opportunities that have been described here are quite likely the primary reasons for this increased usage. As these and as-yet-to-be-created technologies continue to evolve, it is reasonable to expect that such innovations will play an even greater role in instruction and learning.

Conclusions Regarding the History of Instructional Media

Of the many lessons we can learn by reviewing the history of instructional media, perhaps one of the most important involves a comparison between the anticipated and actual effects of media on instructional practices. As Cuban (1986) has pointed out, as you look back over the history of instructional media during the twentieth century, you are likely to note a recurrent pattern of expectations and outcomes. As a new medium enters the educational scene, there is a great deal of initial interest and much enthusiasm about the effects it is likely to have on instructional practices. However, enthusiasm and interest eventually fade, and an examination reveals that the medium has had a minimal impact on such practices. For example, Edison's optimistic prediction that films would revolutionize education proved to be incorrect, and the enthusiasm for instructional television that existed during the 1950s greatly abated by the mid-1960s, with little impact on instruction in schools. However, since the start of the twenty-first century, that pattern seems to have changed. Computers and other digital technologies seem to be having a profound impact on instruction and learning, whether it is at the K–12 level, in higher education, or in business and industry. While a full-scale revolution – one in which the classroom teacher is removed as one of the primary means of delivering instruction – has not taken place and may not come about at any time in the foreseeable future (which, in my opinion, is a good thing), it seems clear to me that computers and the other digital media that have been discussed in this chapter have brought about far greater changes in instruction and learning than the media that preceded them.

HISTORY OF INSTRUCTIONAL DESIGN

As mentioned earlier, in addition to being closely associated with instructional media, the field of instructional design and technology has also been closely

associated with the use of systematic instructional design procedures. As is indicated in Chapter 3 of this book, a variety of systematic instructional design procedures (or models) have been developed and have been referred to by such terms as *the systems approach*, *instructional systems design (ISD)*, *instructional development*, and *instructional design* (which is the term I will use in the remainder of this chapter). Although the specific combination of procedures often varies from one instructional design model to the next, most of the models include the analysis of instructional problems and the design, development, implementation, and evaluation of instruction procedures and materials intended to solve those problems. How did this instructional design process come into being? This portion of the chapter will focus on answering that question.

The Origins of Instructional Design: World War II

The origins of instructional design procedures have been traced to World War II (Dick, 1987). During the war, a large number of psychologists and educators who had training and experience in conducting experimental research were called upon to conduct research and develop training materials for the military services. These individuals, including Robert Gagné, Leslie Briggs, John Flanagan, and many others, exerted considerable influence on the characteristics of the training materials that were developed, basing much of their work upon instructional principles derived from research and theory on instruction, learning, and human behavior (Baker, 1973; Saettler, 1990).

Moreover, psychologists used their knowledge of evaluation and testing to help assess the skills of trainees and select the individuals who were most likely to benefit from particular training programs. For example, at one point in the war, the failure rate in a particular flight training program was unacceptably high. In order to overcome this problem, psychologists examined the general intellectual, psychomotor, and perceptual skills of individuals who were able to successfully perform the skills taught in the program and then developed tests that measured these traits. These tests were used to screen candidates for the program, with those individuals who scored poorly being directed into other programs. As a result of using this examination of entry skills as a screening device, the military was able to significantly increase the percentage of personnel who successfully completed the program (Gagné, personal communication, 1985).

Immediately after the war, many of the psychologists responsible for the success of World War II military training programs continued to work on solving instructional problems. Organizations such as the American Institutes for Research were established for this purpose. During the late 1940s and throughout the 1950s, psychologists working for such organizations started viewing training as a system and developed a number of innovative analysis, design, and evaluation procedures (Dick, 1987). For example, during this period, a detailed task analysis methodology was developed by Robert B. Miller while he worked on projects for the military (Miller, 1953, 1962). His work and those of other early pioneers in the instructional design field are summarized in *Psychological Principles in System Development*, edited by Gagné (1962b).

More Early Developments: The Programmed Instruction Movement

The programmed instruction movement, which ran from the mid-1950s through the mid-1960s, proved to be another major factor in the development of the systems approach. In 1954, B.F. Skinner's article "The Science of Learning and the Art of Teaching" began what might be called a minor revolution in the field of education. In this article and later ones (e.g., Skinner, 1958), Skinner described his ideas regarding the requirements for increasing human learning and the desired characteristics of effective instructional materials. Skinner stated that such materials, called programmed instructional materials, should present instruction in small steps, require active responses to frequent questions, provide immediate feedback, and allow for learner self-pacing. Moreover, because each step was small, it was thought that learners would answer all questions correctly and thus be positively reinforced by the feedback they received.

The process Skinner and others (cf. Lumsdaine & Glaser, 1960) described for developing programmed instruction exemplified an empirical approach to solving educational problems: data regarding the effectiveness of the materials were collected, instructional weaknesses were identified, and the materials were revised accordingly. In addition to this trial and revision procedure, which today would be called formative evaluation, the process for developing programmed materials involved many of the steps found in current instructional design models. As Heinich (1970) indicates:

Programmed instruction has been credited by some with introducing the systems approach to education. By analyzing and breaking down content into specific behavioral objectives, devising the necessary steps to achieve the objectives, setting up procedures to try out and revise the steps, and validating the program against attainment of the objectives, programmed instruction succeeded in creating a small but effective self-instructional system – a technology of instruction.

(p. 123)

The Popularization of Behavioral Objectives

As indicated earlier, those involved in designing programmed instructional materials often began by identifying the specific objectives learners who used the materials would be expected to attain. In the early 1960s, Robert Mager, recognizing the need to teach educators how to write objectives, wrote *Preparing Objectives for Programmed Instruction* (1962). This small, humorously written programmed book, now in its second edition (Mager, 1984), has proved to be very popular and has sold over 1.5 million copies. The book describes how to write objectives that include a description of desired learner behaviors, the conditions under which the behaviors are to be performed, and the standards (criteria) by which the behaviors are to be judged. Many current-day adherents of the instructional design process advocate the preparation of objectives that contain these three elements.

Although Mager popularized the use of objectives, the concept was discussed and used by educators at least as far back at the early 1900s. Among those early advocates of the use of clearly stated objectives were Bobbitt, Charters, and Burk (Gagné, 1965a). However, Ralph Tyler has often been considered

the father of the behavioral objectives movement. In 1934, he wrote, "Each objective must be defined in terms which clarify the kind of behavior which the course should help to develop" (cited in Walbesser & Eisenberg, 1972). During the famous Eight-Year Study that Tyler directed, it was found that in those instances in which schools did specify objectives, those objectives were usually quite vague. By the end of the project, however, it was demonstrated that objectives could be clarified by stating them in behavioral terms, and those objectives could serve as the basis for evaluating the effectiveness of instruction (Borich, 1980; Tyler, 1975a).

In the 1950s, behavioral objectives were given another boost when Benjamin Bloom and his colleagues published the *Taxonomy of Educational Objectives* (1956). The authors of this work indicated that within the cognitive domain there were various types of learning outcomes, that objectives could be classified according to the type of learner behavior described therein, and that there was a hierarchical relationship among the various types of outcomes. Moreover, they indicated that tests should be designed to measure each of these types of outcomes. As we shall see in the next two sections of this chapter, similar notions described by other educators had significant implications for the systematic design of instruction.

The Criterion-Referenced Testing Movement

In the early 1960s, another important factor in the development of the instructional design process was the emergence of criterion-referenced testing. Until that time, most tests, called norm-referenced tests, were designed to spread out the performance of learners, resulting in some students doing well on a test and others doing poorly. In contrast, a criterion-referenced test is intended to measure how well an individual can perform a particular behavior or set of behaviors, irrespective of how well others perform. As early as 1932, Tyler had indicated that tests could be used for such purposes (Dale, 1967). And later, Flanagan (1951) and Ebel (1962) discussed the differences between such tests and the more familiar norm-referenced measures. However, Robert Glaser (1963; Glaser & Klaus, 1962) was the first to use the term "criterion-referenced measures." In discussing such measures, Glaser (1963) indicated that they could be used to assess student entry-level behavior and to determine the extent to which students had acquired the behaviors an instructional program was designed to teach. The use of criterion-referenced tests for these two purposes is a central feature of instructional design procedures.

Robert M. Gagné: Domains of Learning, Events of Instruction, and Hierarchical Analysis

Another important event in the history of instructional design occurred in 1965, with the publication of the first edition of *The Conditions of Learning*, written by Gagné (1965b). In this book, Gagné described five domains, or types, of learning outcomes – verbal information, intellectual skills, psychomotor skills, attitudes, and cognitive strategies – each of which required a different set of conditions to promote learning. Gagné also provided detailed descriptions of these conditions for each type of learning outcome.

In the same volume, Gagné also described nine *events of instruction*, or teaching activities, that he considered essential for promoting the attainment of any type of learning outcome. Gagné also described which instructional events were particularly crucial for which type of outcome and discussed the circumstances under which particular events could be excluded. With *The Conditions of Learning* now in its fourth edition (Gagné, 1985), Gagné's description of the various types of learning outcomes and the events of instruction remain cornerstones of instructional design practices.

Gagné's work in the area of learning hierarchies and hierarchical analysis also has had a significant impact on the instructional design field. In the early 1960s and later in his career (e.g., Gagné, 1962a, 1985; Gagné et al., 1992; Gagné & Medsker, 1996), Gagné indicated that skills within the intellectual skills domain have a hierarchical relationship to each other, so that in order to readily learn to perform a superordinate skill, one would first have to master the skills subordinate to it. This concept leads to the important notion that instruction should be designed so as to ensure that learners acquire subordinate skills before they attempt to acquire superordinate ones. Gagné went on to describe a hierarchical analysis process (also called learning task analysis or instructional task analysis) for identifying subordinate skills. This process remains a key feature in many instructional design models.

Sputnik: The Indirect Launching of Formative Evaluation

In 1957, when the Soviet Union launched Sputnik, the first orbiting space satellite, there began a series of events that would eventually have a major impact on the instructional design process. In response to the launching of Sputnik, the United States government, shocked by the success of the Soviet effort, poured millions of dollars into improving math and science education in the United States. The instructional materials developed with these funds were usually written by subject matter experts and produced without tryouts with learners. Years later, in the mid-1960s, when it was discovered that many of these materials were not particularly effective, Michael Scriven (1967) pointed to the need to try out drafts of instructional materials with learners prior to the time the materials were in their final form. This process would enable educators to examine the materials and, if necessary, revise them while the materials were still in their formative stages. Scriven coined this tryout and revision process *formative evaluation* and contrasted it with what he labeled *summative evaluation*, the testing of instructional materials after they are in their final form.

Although the terms formative and summative evaluation were coined by Scriven, the distinction between these two approaches was previously made by Lee Cronbach (1963). Moreover, during the 1940s and the 1950s, a number of educators, such as Arthur Lumsdaine, Mark May, and C.R. Carpenter, described procedures for evaluating instructional materials that were still in their formative stages (Cambre, 1981). However, in spite of the writings of such educators, very few of the instructional products developed in the 1940s and 1950s went through any sort of formative evaluation process. This situation changed somewhat in the late 1950s and through the 1960s, as many of the programmed instructional materials developed during that period were tested while they were being developed. However, authors such as Susan Markle (1967) decried a lack of rigor in testing processes. In light of this problem,

Markle prescribed detailed procedures for evaluating materials both during and after the design process. These procedures are much like the formative and summative evaluation techniques generally prescribed today.

Early Instructional Design Models

In the early and mid-1960s, the concepts that were being developed in such areas as task analysis, objective specification, and criterion-referenced testing were linked together to form a process, or model, for systematically designing instructional materials. Among the first individuals to describe such models were Gagné (1962b), Glaser (1962, 1965), and Silvern (1964). These individuals used terms such as “instructional design,” “system development,” “systematic instruction,” and “instructional system” to describe the models they created. Other instructional design models created and employed during this decade included those described by Banathy (1968), Barson (1967), and Hamerus (1968).

The 1970s: Burgeoning of Interest in the Systems Approach

During the 1970s, the number of instructional design models greatly increased. Building upon the works of those who preceded them, many individuals created new models for systematically designing instruction (e.g., Dick & Carey, 1978; Gagné & Briggs, 1974; Gerlach & Ely, 1971; Kemp, 1971), several of which became “standards” in the field. Indeed, updated versions of at least two of these models (Dick et al., 2009; Morrison et al., 2010) are still frequently taught to graduate students studying instructional design.

During the 1970s, interest in the instructional design process flourished in a variety of different sectors. In 1975, several branches of the United States military adopted an instructional design model (Branson et al., 1975) intended to guide the development of training materials within those branches. In academia, during the first half of the decade, many instructional improvement centers were created with the intent of helping faculty use media and instructional design procedures to improve the quality of their instruction (Gaff, 1975; Gustafson & Bratton, 1984). Moreover, many graduate programs in instructional design were created (Partridge & Tennyson, 1979; Redfield & Dick, 1984; Silber, 1982). In business and industry, many organizations, seeing the value of using instructional design to improve the quality of training, began adopting the approach (cf. Mager, 1977; Miles, 1983). Internationally, many nations, such as South Korea, Liberia, and Indonesia, saw the benefits of using instructional design to solve instructional problems in those countries (Chadwick, 1986; Morgan, 1989). These nations supported the design of new instructional programs, created organizations to support the use of instructional design, and provided support to individuals desiring training in this field. Many of these developments were chronicled in the *Journal of Instructional Development*, a journal that was first published during the 1970s.

The 1980s: Growth and Redirection

In many sectors, the interest in instructional design that burgeoned during the previous decade continued to grow during the 1980s. Interest in the instructional design process remained strong in business and industry (Bowsher,

1989; Galagan, 1989), the military (Chevalier, 1990; Finch, 1987; McCombs, 1986), and in the international arena (Ely & Plomp, 1986; Morgan, 1989).

In contrast to its influence in the aforementioned sectors, during the 1980s instructional design had minimal impact in other areas. In the public school arena, some curriculum development efforts involved the use of basic instructional design processes (e.g., Spady, 1988), and some instructional design textbooks for teachers were produced (e.g., Dick & Reiser, 1989; Gerlach & Ely, 1980; Sullivan & Higgins, 1983). However, in spite of these efforts, evidence indicated that instructional design was having little impact on instruction in the public schools (Branson & Grow, 1987; Burkman, 1987b; Rossett & Garbosky, 1987). In a similar vein, with a few exceptions (e.g., Diamond, 1989), instructional design practices had a minimal impact in higher education. Whereas instructional improvement centers in higher education were growing in number through the mid-1970s, by 1983 more than one-fourth of these organizations were disbanded and there was a general downward trend in the budgets of the remaining centers (Gustafson & Bratton, 1984). Burkman (1987a, 1987b) provides an enlightening analysis of the reasons why instructional design efforts in schools and universities have not been successful and contrasts these conditions with the more favorable conditions that exist in business and the military.

During the 1980s, there was a growing interest in how the principles of cognitive psychology could be applied in the instructional design process, and a number of publications outlining potential applications were described (e.g., Bonner, 1988; Divesta & Rieber, 1987; "Interview with R.M. Gagne", 1982; Low, 1980). However, several leading figures in the field have indicated that the actual effects of cognitive psychology on instructional design practices during this decade were rather small (Dick, 1987; Gustafson, 1993).

A factor that did have a major effect on instructional design practices in the 1980s was the increasing interest in the use of personal computers for instructional purposes. With the advent of these devices, many professionals in the instructional design field turned their attention to producing computer-based instruction (Dick, 1987; Shrock, 1995). Others discussed the need to develop new models of instructional design to accommodate the interactive capabilities of this technology (Merrill et al., 1990a, 1990b). Moreover, computers began to be used as tools to automate some instructional design tasks (Merrill & Li, 1989).

The 1990s: Recognizing the Importance of Performance

Beginning in the 1990s and continuing on into the current century, one of the trends that has had a major impact on the field has been the human performance improvement movement (see Section V of this book). This movement, with its emphasis on on-the-job performance (rather than learning), business results, and non-instructional solutions to performance problems, has broadened the scope of the instructional design field.

During the 1990s another factor that began to have a major influence on the field was the growing interest in constructivist views of teaching and learning. For example, the constructivist emphasis on designing "authentic" learning tasks – tasks that reflect the complexity of the real-world environment in which learners will be using the skills they are learning – has had an effect on how instructional design is being practiced and taught.

During the 1990s, instructional designers also began to have an interest in using computers not only as an instructional tool to enhance learning, but to also as an aid to improve on-the-job performance. In particular, it was during this decade that an interest in using electronic performance support tools and systems to support on-the-job performance began to flourish. In addition, during this decade instructional designers began to discuss the use of computer-based knowledge management systems to support learning and performance (viz., Schwen et al., 1998).

Instructional Design in the Twenty-First Century

During the first quarter of the twenty-first century, several developments have had a major influence on the field of instructional design. One such development involves the increasing use of the Internet as a means of presenting instruction to learners and supporting learners' ability to find useful resources, to learn from and with other learners, and to create their own artifacts as part of the learning process. Along with this growth has come the realization that instructional designers play a vital part in the creation of high-quality learning opportunities. The pandemic that began in 2020 and the consequent reliance on online learning without proper instructional design have demonstrated this very clearly. This realization has opened new job opportunities for those in the instructional design field and has also presented new challenges as instructional design professionals attempt to meet the ongoing needs for designing effective online instruction.

Another recent development that has had a major impact on the instructional design field has been the increasing reliance on informal learning (Chapter 19), as opposed to formal training, as a means of improving learning and performance in the workplace. In recent years, as people in the workplace have increasingly turned to innovations such as social media (Chapter 33) and artificial intelligence (Chapter 34) to help them perform their jobs, the need for formal training has decreased. As a result, many instructional designers have had to expand their professional toolkits; they have needed to learn how to design and promote the use of these alternate means of facilitating skill acquisition.

A third factor that has affected the instructional design field in recent years involves the concerns that some individuals in the field expressed about "traditional" instructional design models, such as the ADDIE model. These concerns include the view that traditional models often take too long to implement, that effective instruction can be designed in a more efficient manner using simpler design models. This concern and a number of others are discussed in several chapters in this book (for example, see Chapter 3, Chapter 5, and Chapter 39). In spite of these concerns, and/or perhaps because a substantial number of professionals in the field have adapted the design processes they employ in light of them, the demand for instructional designers in business and industry and higher education remains strong today (Decherney & Levander, 2020; Evans, 2023) and is likely to remain strong in the foreseeable future.

CONCLUSION

Although this chapter has provided separate accounts of the history of instructional media and the history of instructional design, there is an obvious

overlapping between these two areas. Many instructional solutions arrived at through the use of instructional design processes require the employment of the instructional media discussed in the first half of this chapter. Moreover, many individuals (e.g., Clark, 2001, 1994; Kozma, 1994; Morrison, 1994; Reiser, 1994; Shrock, 1994) have argued that the effective use of media for instructional purposes requires careful instructional planning, such as that prescribed by models of instructional design. In the field of instructional design and technology, those whose work is influenced by the lessons learned from the history of media *and* the history of instructional design will be well-positioned to have a positive influence on future developments within the field.

Summary of Key Principles

1. Throughout most of the 1900s, as each new medium (i.e., films, radio, and television) entered the world of education, there was a great deal of optimism regarding the extent to which that medium would change instructional practices. However, contrary to expectations, none of the aforementioned media had nearly the effect that the optimists envisioned.
2. The likely reasons as to why each medium had minimal effects on practice are many. Those that are frequently cited include teacher resistance to change, especially *top-down change*; the costs associated with purchasing and maintaining the necessary media hardware; the poor instructional quality of media software; and failure to provide teachers with adequate guidance as to how to integrate the new media into their instructional practices.
3. In recent years, computers and related technologies have had a greater effect on instructional practices and learning than did the various media that preceded them. The interactive capabilities of these media, their ability to present information and instruction in a wide variety of forms, and the ease with which learners can create and share their own knowledge and skills via these media appear to be some of the primary reasons why these media have had a greater influence on instruction and learning.
4. Portions of most of the instructional design models that were created in the 1960s and 1970s, and which still remain popular today, can be traced back to developments in education and training during the 1940s through the 1960s. Advances in military training during World War II, new directions in instruction emanating from the programmed instruction movement, and new ideas involving behavioral objectives, criterion-referenced testing, learning hierarchies, and formative evaluation are often reflected in the various steps in these models.
5. In the 1980s and 1990s, many instructional design models and practices were influenced by principles derived from cognitive psychology and the new views of teaching and learning associated with constructivism. Moreover, during that period the performance improvement movement led many instructional designers to begin thinking about the importance of positively influencing on-the-job performance and identifying non-instructional, as well as instructional, means of doing so.

6. During the first quarter of the twenty-first century, several factors have had a major influence on the field of instructional design. The increasing interest in such areas as online learning, artificial intelligence, social media, informal learning, game-based learning, augmented and virtual reality, and many others has opened new

opportunities for instructional designers, and at the same time have required them to expand their professional toolkit. Moreover, concerns that have been expressed about “traditional” instructional design models have led some in the profession to propose and use alternate models of design.

Application Questions

1. During the previous school year, all the students assigned to four subject area teachers (math, language arts, social studies, and science) in the seventh grade at a local middle school were given laptop computers and provided with wireless Internet access at home and in school for an entire year. The students took the laptops home every evening and brought them into classes every day. Teachers were also provided with laptops and wireless Internet access 24/7 (24 hours a day, every day of the week) for the entire year. Moreover, all of the curriculum materials (textbooks, workbooks, student study guides, teacher curriculum guides, etc.) that the teachers normally used during the school year were installed on the laptops.

Assume that you were assigned as one of the evaluators for the project just described and that throughout the year you examined how this innovation (providing teachers and students with 24/7 access to laptops, curriculum materials, and wireless Internet service) changed the way instruction was presented in the classrooms of the four teachers who were involved in the project. Further, assume that your findings clearly indicated that

the innovation had very little effect on the manner in which instruction was presented in the teachers’ classrooms. Now do the following:

- a. Describe at least three possible reasons (factors) why the project had very little effect on the instructional practices employed by the teachers. Each of the factors you identify should be related to the factors mentioned in this chapter as to why earlier forms of instructional media (i.e., films, radio, and television) had very limited effects on instructional practices.
 - b. Describe at least two strategies that could have been employed to help mitigate the factors that you think contributed to the minimal effect this project had on instructional practices. Indicate why you think each of these strategies might have been helpful.
2. Congratulations! Your instructional design consulting company has just been selected as one of the finalists to receive a contract to design a print-based instructional unit that will teach sixth-grade students throughout the United States how to multiply fractions. Now, in order to receive the contract,

the contracting agency has asked you to prepare a memo in which you describe why your company is well-suited to take on this task. However, as noted here, this memo isn't your normal memo!

The agency's chief contract officer feels that the contract should be awarded to someone who understands the history of instructional design and can apply the ideas from that history to today's instructional design tasks. Therefore, he has asked that each of the finalists to send him a 250–300-word memo in which they select *four* of the six historical periods listed here and briefly describe how

an instructional design principle derived from that period might be used in the design and/or presentation of the instructional unit on fractions. Write the memo!

Historical periods:

- World War II
- Programmed instruction movement
- Behavioral objectives movement
- Criterion-referenced testing movement
- Early work of Robert M. Gagné
- Formative evaluation movement

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SECTION **II**



Models of Instructional Design



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Characteristics and Evolution of Foundational Instructional Design Models

Tonia A. Dousay, Jill E. Stefaniak, and Robert Maribe Branch

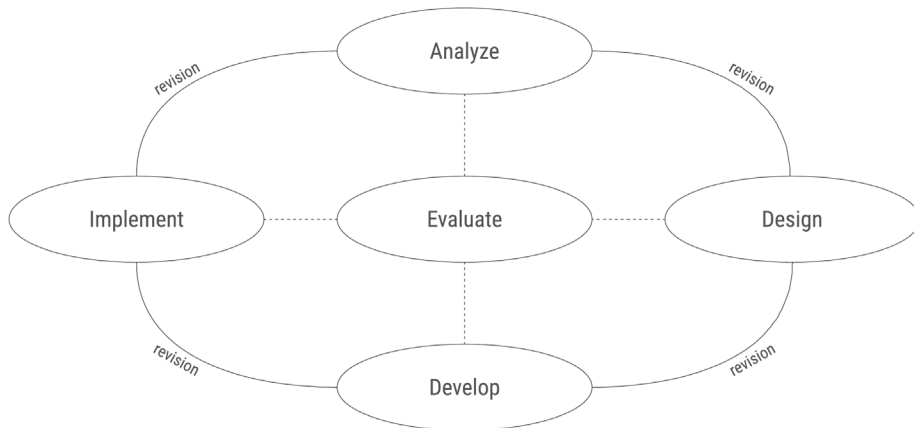
Although scholars debate the exact origins of the instructional design process, Silvern's (1965) early attempt at applying general systems theory (GST) to accomplishing learning tasks and solving instructional problems stands out. This model, and practically all other early instructional design models, was based on behaviorism, which, while commonly associated with B. F. Skinner and stimulus-response theory, held far more encompassing theoretical and philosophical perspectives that we see exhibited in contemporary learning designs. Appropriately, Burton et al. (1996) broadly defined behaviorism as the philosophy and values associated with measuring and studying human behavior. Thus, it follows that the field draws upon cognitive psychology, particularly from the perspective of information processing and the work of Gagné (1985), who made major contributions to the underlying theories of instructional design.

INTRODUCTION

Instructional design is a system of procedures for developing education and training materials consistently and reliably. Since the 1970s, designers and organizations have generated a wide variety of instructional design models (Branch & Dousay, 2015; Dousay & Branch, 2022; Gustafson & Branch, 2002), and most of those models consist of five phases. These five phases are often called the ADDIE process (see Figure 3.1).

ADDIE is an acronym for Analyze, Design, Develop, Implement, and Evaluate and represents a systematic product development concept. Creating products using an ADDIE process remains one of today's most effective tools. However, ADDIE is not a specific, fully elaborated model in its own right, but rather a paradigm that refers to a family of models with a common underlying

FIGURE 3.1 Core elements of instructional design



structure (Branch, 2009). This paradigm is based on the concept of systematic product development, which owes much of its evolution to the formation and rise of social communities. For a discussion of the difference between processes and models, see Dousay and Stefaniak (in press).

Analyze often includes conducting a needs assessment (Rossett, 1993), identifying a performance problem in a business setting or some other environment (Gilbert, 1978; Harless, 1975), and stating a goal (Mager, 1984a). *Design* includes writing objectives in measurable terms (Mager, 1984b; Dick et al., 2021; Smith & Ragan, 1999), classifying learning as to type (Gagné et al., 2005; Merrill, 1983), specifying learning activities (Briggs et al., 1991), and specifying media (Reiser & Gagné, 1983; Smaldino et al., 2019). *Development* includes preparing student and instructor materials as specified during design (Morrison et al., 2019). *Implementation* includes delivering the instruction in the settings for which it was designed (Greer, 1996). *Evaluation* includes formative and summative evaluation and revision (Dick et al., 2021). Formative evaluation involves collecting data to identify needed revisions to the instruction, while summative evaluation involves collecting data to assess the overall effectiveness and worth of the instruction. Revision involves making needed changes based on the formative evaluation data.

According to Molenda (2008), the ADDIE label seems to have evolved informally through oral tradition rather than being formalized as a term by a single author. Molenda further asserted that ADDIE has become a colloquial term used to describe a systematic approach to instructional design.

PURPOSE OF INSTRUCTIONAL DESIGN MODELS

While ADDIE illustrates the conceptual components of instructional design, it does not illustrate the realities of instructional design in practice, contextualized by different realities and educational problems. Reiser (2001) noted, “Although the specific combination of procedures often varies from one instructional design model to the next, most of the models include design, development, implementation, and evaluation of instructional procedures and materials intended to solve those problems” (p. 58). Models are conceptual representations of reality, simplifying a complex explanation too complex to illustrate. Every instructional design situation is unique and specific due to human factors, variable resources, and other

temporal and transactional differences. Thus, models often seek to identify what is generic and applicable across multiple contexts. Instructional design models serve this purpose by describing how to conduct the instructional design process's various steps. Instructional design models also allow people to visualize the overall process, establish guidelines for its management, and communicate among team members and with clients. Decades of proliferating instructional design processes intermingled with chasing educational theory trends have produced various instructional design models for different settings (Branch & Dousay, 2015; Dousay & Branch, 2022; Dousay & Stefaniak, in press; Gustafson & Branch, 1997, 2002).

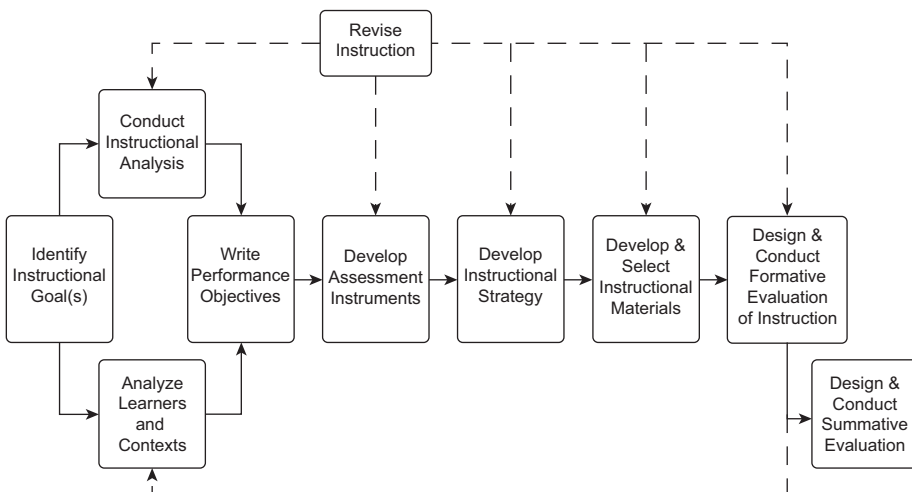
Knowing the many different instructional design models does not necessarily support the knowledge or skill development of new professionals entering and advancing in the field. Rather, focusing on practical considerations better equips new designers with the significant considerations that will impact their day-to-day design decisions. Referring to the useful sets of case studies on instructional design published by Ertmer et al. (2019) may aid practical understanding regardless of context.

VISUAL DEPICTIONS OF INSTRUCTIONAL DESIGN MODELS

Just as ADDIE presents a familiar framework by which we might consider or learn an instructional design process, we classify or use one of three visual depictions to discuss specific instructional design models. Consider Dick et al.'s (2021) popular and influential instructional design model based on systems theory (see Figure 3.2). As with most systems, the figure portrays the instructional design model as rectilinear, with rows of boxes connected by straight lines, one-way arrows, and a return line parallel to other straight lines.

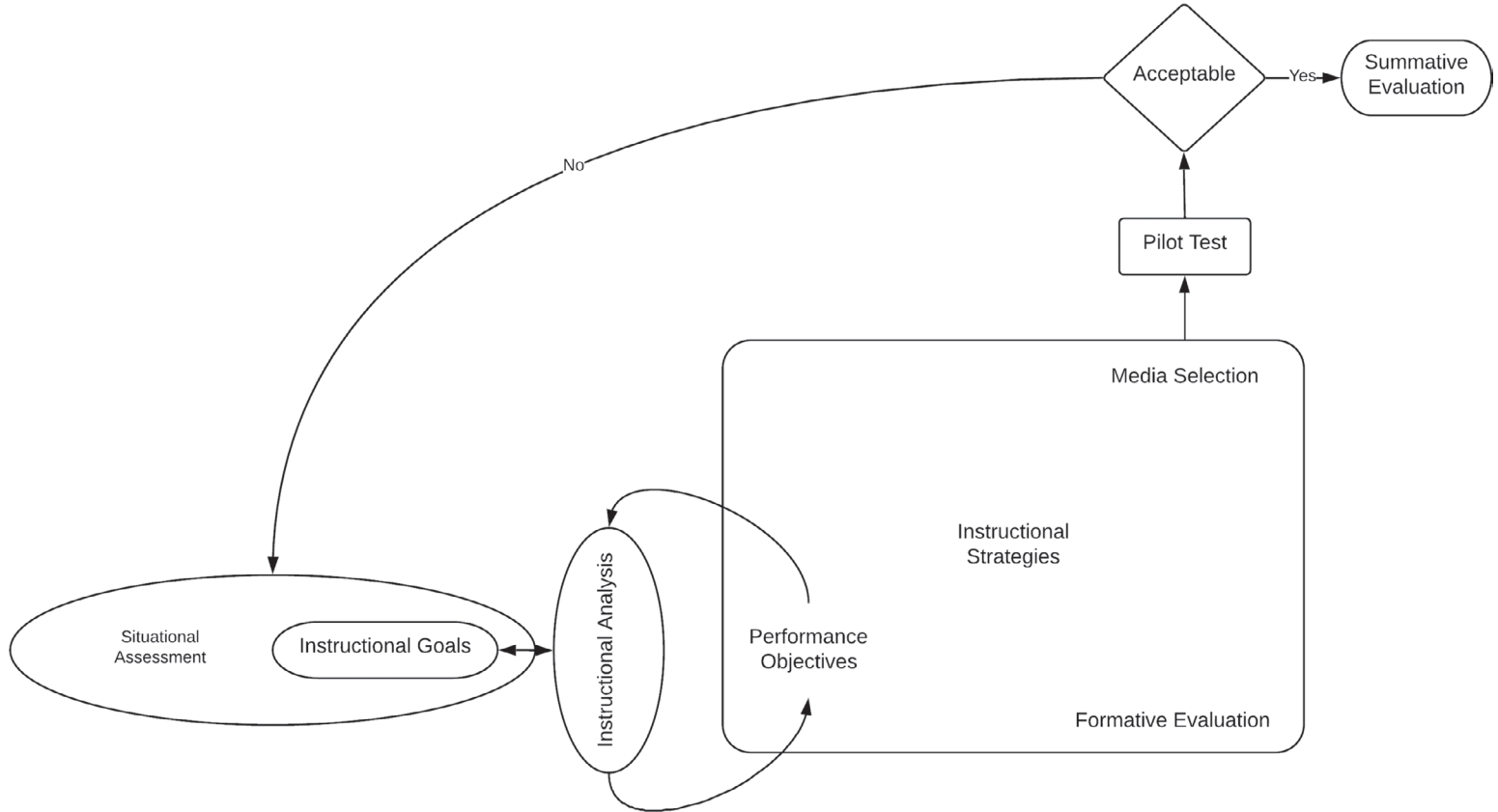
However, depicting instructional design as a curvilinear flow, such as in Figure 3.3, with an opportunity to revisit stages, more accurately communicates

FIGURE 3.2 Dick et al. (2021)¹



¹ Reprinted by permission.

FIGURE 3.3 A curvilinear instructional design model based on a systems approach to instructional design (Dousay & Branch, 2022)



the process in practice. Curvilinear components in ovals connect with two-way arrows and curved lines more effectively, acknowledging the complex reality of practicing instructional design. Additionally, curvilinear portrayals of instructional design models tend to communicate more iterations, which better characterizes typical instructional design practice (Branch, 1996).

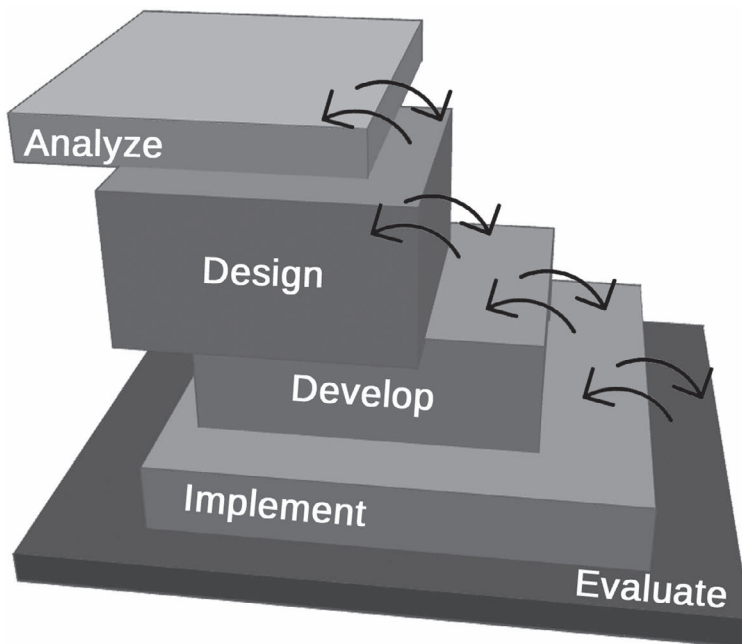
From a more advanced perspective, Figure 3.4 also illustrates instructional design using curvilinear elements. In this conceptual waterfall applying a systems approach, we more realistically see how instructional design is an overlapping, recurring, and iterative process.

Instructional design activities typically are not completed linearly, step by step, although they may be portrayed in such a way for initial understanding and convenience. For example, during the life of a project, as data are collected and the design team gains insights, it is often necessary to move back and forth among the activities of analysis, design, and formative evaluation and revision. The instructional design process's iterative and self-correcting nature is one of its greatest strengths.

Systems Theory

Soon after acknowledging behaviorism as a tenet of instructional design, general systems theory (Bertalanffy, 1968) emerged as another fundamental tenet of instructional design. The general systems concept is characterized as being systematic, systemic, responsive, interdependent, redundant, dynamic, cybernetic, synergistic, and creative. *Systematic* means agreeing to adopt rules and

FIGURE 3.4 A three-dimensional depiction of the instructional design process based on the waterfall concept



procedures to move through a process. However, being systematic does not mean indiscriminately following a sequence without reflection on the process. *Systemic* stresses the application of creative problem-solving methods. The evidence that something is systemic is when you can observe that all system components respond when a single component within that system is stimulated. *Responsive*, within the context of instructional design, means accepting whatever goals are established as its orientation. *Interdependence* means that all elements within a system are connected to every other element within that same system and, therefore, all elements depend on each other to accomplish the system's goals. *Redundant* refers to duplicate processes and duplicate procedures that are intended to prevent the failure of the entire system. *Dynamic* means the system can adjust to changing conditions and constantly monitors its environment. *Cybernetic* means the elements efficiently communicate among themselves for steering, governing, and guiding. Cybernetics is most often associated with theories related to automated control systems. *Synergistic* means that all the elements can achieve more together than the individual elements can achieve alone. Thus, the whole is greater than the sum of its parts. *Creativity* in instructional design refers to the use of special human talents and imagination in generating original ideas that permit instructional designers to expand the limitations of any system.

As instructional designers, it is important to note that designing within a system is essential to instructional design (Stefaniak, 2020). By considering the systematic and systemic relationships impacted by our design work, we are better positioned to design solutions that will have a greater impact on the stakeholders impacted by the system. The system can represent several entities depending on the purpose of our design work, such as K–12 schools, higher education institutions, and corporations. Within each of these larger settings are subsettings, each with its own needs, rules, and nuances that contribute to (or sometimes hinder) its functionality.

Systems thinking translates greatly into our needs assessment, feedback, and evaluative processes. Attending to the needs of our learners and planning to think about how our design work will be used to improve and support their learning can help us to think about the bigger picture. Iterative feedback sought from multiple constituents during the design phases of projects also emulates a systems-thinking approach. Lastly, evaluative practices at the formative, summative, and confirmative levels enable us to ensure that what we have designed and implemented is serving its intended purposes.

Foundational Models

Silvern (1965) was one of the most influential instructional design model builders in the 1950s and 1960s. His work with the military and aerospace industry resulted in an extremely complex and detailed instructional design model with multiple variations that drew heavily on general systems theory. Although rarely used today, Silvern's instructional design model remains an excellent original resource for those curious about the deeper foundations of the field. The model provides a parallel organizer to process Silvern's sometimes obscure writing.

Students of the instructional design process who take the time to review Silvern will easily recognize Silvern's influence on contemporary instructional

design models. For example, the iterative nature of instructional design also yields evolving instructional design models. The advent of whole-task instructional design models, which facilitate the implementation of Merrill's (2002, 2007, 2009, 2020) *First Principles of Instructional Design*, specify the learning content at the beginning of the process and then construct a progression of increasingly complex tasks.

SEVEN CHARACTERISTICS OF INSTRUCTIONAL DESIGN

Regardless of the underlying components or purpose of an instructional design model, seven characteristics are present in almost all instructional design efforts:

1. Instructional design is a student-centered process
2. Instructional design is a goal-oriented process
3. Instructional design is a creative process
4. Instructional design focuses on meaningful performance
5. Instructional design assumes outcomes are measurable, reliable, and valid
6. Instructional design is an empirical, iterative, and self-correcting process
7. Instructional design is typically a team effort

Instructional Design Is a Student-Centered Process

Student-centered instruction prioritizes learners and their performance as the focal points of all teaching and learning activities. Student-centered learning serves as a practice and a principle that should permeate any instructional design endeavor based on the idea that instructional design is about designing for students first. The teaching and learning concept of instructional design promoted in this chapter moves away from designs that encumber didactic, limiting, passive, and singular modes of teaching and instead moves toward designs that facilitate active, multi-functional, inspirational, situated approaches to intentional learning. Teaching, then, becomes a way to promote knowledge construction and skill development. Self-study and group study, technology-based instruction, and teacher-based strategies are all options to be considered, with the result often being a mix of all these and other strategies. Students may also have opportunities to confirm or modify learning objectives in some circumstances. This change in perspective from teaching to learning represents a paradigm shift of immense power when planning for effective educational environments.

Instructional Design Is a Goal-Oriented Process

Establishing well-defined project goals is central to the instructional design process. Goals should reflect client expectations for an instructional design project and, if met, ensure its appropriate implementation. However, many well-intended projects fail from a lack of agreement on the goals or the decision to omit this important step in the false belief of settling this issue later. Identifying and managing client expectations is particularly important to the project manager, but team members must also share a common vision

of the project's anticipated outcomes. The ultimate question for an instructional system is: *Were the project goals attained?* The instructional design process responds to situations attributed to a lack of knowledge and skills. The instructional design process accepts identified goals as the first step in the process. Therefore, educators and other instructional designers must first identify the curriculum or course goals before initiating any instructional design to respond to a lack of knowledge or skills. Without goals, there can be no instructional design.

Instructional Design Is a Creative Process

Instructional design is a creative process. While instructional designers often follow a general set of procedures to design instructional materials, the specific manner in which they do so varies greatly across individuals. Moreover, individual instructional designers usually vary their procedures from one situation to another. In addition, in most cases, instructional designers use their creativity to design and develop instructional activities rather than rely on templates. In an instructional design text geared toward teachers, Carr-Chellman (2011) suggests that "Doing creative things with your classroom instruction will produce better results overall. Avoid ruts and comfort and keep reaching for the stars, doing new things, creating exciting and fun approaches to your classroom-learning experiences" (p. 4). This point of view should be heeded by all those involved in designing instruction.

Instructional Design Focuses on Meaningful Performance

Instructional design focuses on preparing students to perform meaningful and perhaps complex actions, including solving authentic problems, rather than simply requiring students to recall information or apply rules on a contrived task. Assuming that learning objectives reflect the environment in which students apply the constructed knowledge or acquired skill, there should be a high degree of congruence between the learning environment and the setting where the actual knowledge and skills should be displayed. While identifying performance settings for training programs, such as operating a drill press, may be easier than for school-based learning, such as a college biology course, instructional designers should strive to identify authentic performance measures for both settings. Operational tools such as PERT charts, nominal group techniques, task analysis diagrams, lesson plan templates, worksheets for generating objectives, and production schedule templates contextualize the instructional design process and, as such, make instructional design a practical approach to addressing educational problems that are due to a lack of knowledge and skill.

Instructional Design Outcomes Are Measurable, Reliable, and Valid

The instructional design process centers around outcomes that can be measured. In other words, it focuses on behaviors, specific skills, knowledge, and attitudes that learners should acquire as a result of engaging in a particular set of instructional activities. If there is no way to measure whether a learner

is able to perform a specific behavior, then the instructional designer cannot judge whether the instruction he or she designed was effective.

Reliability and validity arise as issues of major concern when measuring whether learners have acquired specific behaviors. In this context, reliability refers to the consistency of the assessment across time and individuals. If the assessment technique cannot consistently measure whether someone has acquired a desired outcome, its reliability is compromised. Thus, the designer cannot adequately determine whether the instruction that he or she designed was effective. Similarly, validity refers to the degree to which an assessment technique or tool measures what it is supposed to measure. For example, if the objective is to safely and efficiently operate a drill press, then a valid (authentic) assessment technique would likely involve two phases. First, an observer with a checklist would observe the learner performing selected drilling operations. Second, the examiner would also assess the quality of the products created. Conversely, a multiple choice, paper and pencil test would not be a valid measure.

Instructional Design Is an Empirical, Iterative, and Self-Correcting Process

Data are the heart of the instructional design process. Data collection begins during the initial analysis phase and continues through implementation. For example, during the analysis phase, data may be collected to compare a student's actual knowledge and skill to the desired knowledge and skill. Data collection and data-driven decisions continue to influence the process – guidance and feedback from subject matter experts ensure the accuracy and relevance of the instructional knowledge and skills. Results of research and prior experience guide the selection of instructional strategies and media. Formative evaluation data guides necessary revisions, and data from the field after implementation indicates instructional effectiveness. Although the data may not always bring good news, they are always *friendly* in that they provide a rational basis for decision-making and a basis for successfully completing the project. Thus, the instructional design process is empirical, iterative, and self-correcting.

Instructional Design Is Typically a Team Effort

Although one individual can complete an instructional design project, instructional design is typically a team effort. The instructional design process is a collaboration among a design team, clients, sponsors, and primary and secondary stakeholders. Collaboration manifests in many ways and levels within instructional design processes and practices. Due to their size, scope, and technical complexity, most instructional design projects require the specialized skills of a variety of individuals. An instructional design team typically will consist of a subject matter expert, an instructional designer, one or more production personnel, clerical support, and a project manager. Sometimes a single individual may play more than one role on a team, but larger projects invariably require greater specialization. For example, high-tech projects may require computer programmers, videographers, editors, graphic artists, and interface designers. Demands for logistic support in the form of clerical staff, librarians, business managers, and system support expand as the size and duration of projects increase.

CONCLUSION

Final Considerations

Effective instructional design models, first and foremost, account for several independent complicated entities, including, but not limited to, students and their peers, content, delivery systems, time, goals, and the instructor. Second, instructional design models allow relevant entities to enter and exit the instructional design process at various points depending on a particular learning task. Third, instructional design models display resilience by satisfying stakeholder expectations and employing multiple paths to success. Fourth, cybernetic attributes characterize instructional design models, permitting instructional designers to treat the diversity associated with uncertainty and unpredictability as assets in the instructional design process.

Instructional design is a complex process that requires more than writing objectives, publishing training manuals, and placing lesson plans online. Because instructional design is an applied product development process, the expertise required to practice instructional design includes minimum competencies, such as those promoted by the International Board of Standards for Training, Performance, and Instruction (Koszalka et al., 2013) and other researchers examining instructional design competencies being used in the field (e.g., Klein & Kelly, 2018; Martin et al., 2022; Ritzhaupt & Kumar, 2015; Wang et al., 2021). An instructional design process works best when matched to a corresponding context. However, educational contexts are often complex and feature complex issues related to teaching and learning. Therefore, effective instructional design models must be sensitive to different educational contexts and responsive to complex teaching and learning situations. Instructional design should accommodate emerging theories about intentional learning and the broad array of contexts in which instructional design is applied, such as open online courses, the flipped classroom, online learning environments, and the exponential growth of open educational resources (OERs). Finally, instructional design is an empirical process that is student-centered, goals-oriented, and directed toward reliable and valid measurement of meaningful knowledge and skills.

The Future of Instructional Design Models

When considering the future of instructional design models, discussions oscillate along a spectrum from calling the field dead to demanding an evolution with new technologies or models. In some cases, the former argument relies on semantics between *instructional* and *learning* or *design* and *engineering* (e.g., learning engineering). Phrasing aside, language and practices do and have evolved, as evident by the various names of the academic programs that generate future designers. Shifting to the latter end of the spectrum, criticism generally views existing models critically as being lesser for not addressing specific needs or practices. Rather than posit contrived lists based on rapidly shifting advancements, we pose the following questions as a critical thinking challenge to practitioners and scholars:

1. Do we really follow a model as a prescription or blueprint?
2. Does it matter that we don't have a model for every context or design decision necessary for a given context?

3. Just because a specific action is not part of the model, does it mean it is not worth considering?
4. As the field evolves, so too do its design considerations. Are there recent social, political, or economic factors that we should consider when using instructional design models?
5. Should our instructional design models be adjusted in light of ethical considerations? How?
6. How might the core characteristics of a project affect the nature of the instructional design model we employ?

Summary of Key Principles

1. Instructional design is student-centered. Students and their performance are the focal points of instructional design activities. Teaching is a means to facilitate knowledge construction and student performance. Students actively participate in confirming learning objectives and instructional strategies.
 2. Instructional design focuses on measurable outcomes. There should be a high correlation between student work during a course and the outcome expected by a student upon learning experience completion. Thus, evaluation tools used during the instructional design process should be situated within reality and administered within authentic contexts.
 3. Instructional design is a partnering process. The success of an instructional development project often depends on the ability of the instructional designer to collaborate with the primary stakeholders effectively.
- The collaborative effort typically requires the lead designer to serve as a project manager, where the client, subject matter experts, and core team members are all considered partners.
4. Instructional design is systemic. An instructional designer should plan and design their project by taking into account how the project and its associated outcomes will impact other initiatives and stakeholders within the system.
 5. Instructional design is empirical, iterative, and self-correcting. Collecting data from multiple sources initiates the instructional design process, typically in the form of analyses, and continues through the entire instructional design process, commonly through formative and summative evaluation. These data provide evidence of the effectiveness of the actions taken during the design process and increase the probability of a high-quality learning product.

Application Questions

1. Study the rectilinear, curvilinear, and waterfall portrayals of the instructional design process mentioned in this chapter. Then either adapt one of these models for your context or create an entirely new instructional design model that best accommodates your situation. What components did you consider essential for your instructional design model?
2. A large plumbing company has recently hired you to design a

course to train recent high school graduates how to perform some basic plumbing skills. Describe how you might use each of the

seven instructional design characteristics described in this chapter to help you design an effective course.

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You Only Need Three Crayons

An Instructional Design Theory

M. David Merrill

DEVELOPING A THEORY

My father was an artist. As a small boy, I wanted to be an artist like my father. I thought that if I could just have a large box of Crayola crayons, I would be able to paint beautiful landscapes like my father. For every birthday, I would request a large box of crayons. I was unaware of the precarious financial affairs of my parents. My dad never said they couldn't afford a large box of crayons. He merely sat down with three crayons – red, yellow, and blue – and a piece of paper and colored a beautiful landscape. By example, he taught me the primary colors and mixing pigments. For my birthday I would get a box of eight Crayola crayons. My dad would point out that I had more crayons than I needed to paint beautiful landscapes. I didn't become an artist, but I never forgot my primary colors and how to combine them to get all the colors of the rainbow. Throughout my education, I learned that almost all the entities, procedures, and processes in the world are also composed of a few basic elements and their relationships. In my career, I remembered that you only need three crayons.

While I was in graduate school B.F. Skinner came to make a presentation at the University of Illinois. Like my fellow classmates, I went to hear the great man. I don't remember many of the details of his lecture, but his answer to a question significantly influenced my career. "Dr. Skinner in your book [which he named] you said such and such [some detail of Skinner's theory], but tonight you seemed to contradict yourself by saying such and such [I quoted part of Skinner's speech.]" Skinner's answer became a guide for my career, "What I've tried to do is to make only a few assumptions and then see how much of human learning we can explain with only these assumptions." "Good grief," I thought, "just like my dad

could paint a beautiful painting with only a few crayons, Skinner could explain human learning with only a few basic elements, in Skinner's case stimulus-response bonds and their relationships."

For one of my classes, much of the learning research we studied was based on learning nonsense syllables and the investigators would then extrapolate the findings to all learning. I felt that learning concepts and principles required more than rote memorization and that different learning activities would be required for these higher-level skills. For the class, I wrote a paper titled "Two Kinds of Learning." I tried to identify the different learning activities that would be required for meaningful learning and rote learning.

My professor handed me a manuscript for a book he was reviewing for publication. The manuscript was for Robert Gagné's book *The Conditions of Learning*. He proposed that there were five different kinds of learning and that different conditions were required for each type of learning. I wrote Gagné a letter indicating that he had written the book that I had hoped to write. His ideas provided a starting place for my own eventual work (Gagné, 1965, 1970, 1977, 1985).

Later, while studying learning theories and instructional theories, it was apparent that learning theories explained how learners acquire and store knowledge, but they had very little to say about how instruction should structure and sequence knowledge to promote effective, efficient, and engaging learning. I decided that a primary goal for my career would be to find or develop an instructional theory using only a few basic elements.

During the summer of 1969, I was invited into the office of Darrell Monson, the associate vice president of Brigham Young University. My tenure at the university was only a couple of years old and I couldn't imagine the reason for the visit. "Would you be willing to join the Learning Resources Division of the university and start a media research department?" was his surprising request. "I'll provide the money for two full-time positions, a full-time secretary, and some initial operating capital."

I was stunned but recovered enough to reply, "I don't want to run a media research department. I'm interested in instructional research." And I stammered out the difference. "Okay," he said, "then start an instructional research department."

I proposed creating a department based on synergy. I suggested hiring professionals who had credentials qualifying them both to teach in a university academic department as well as do research in the research department. Vice President Monson agreed with this arrangement.

This was an opportunity beyond my wildest imagination. I agreed to accept a half-time appointment and launch this new research unit. Thus was launched the BYU Department of Instructional Research and Development (IRD). My academic appointment was at the College of Education. The dean of the college was less enthusiastic about establishing such a department, but with Harvey Black, the first hire for the new department, a proposal was made to the committee appointed by the dean and after many weeks of negotiation, *Instructional Psychology*, the academic half of this dual department, was tentatively approved.

Bob Tennyson, a tall young man walked into my office and said, "I've come to work with you." The academic department had not yet been approved, so I asked if he was willing to be a test case for the new dual department. Bob agreed.

"Have you ever written a proposal?"

"No, but I'm sure that I could."

After many meetings and many drafts, the proposal was submitted to NSF and approved. Bob was the first student in our new academic/research department and was the first to graduate with his PhD. His dissertation research was very significant and provided strong research support for how to teach concepts (Tennyson et al., 1972). We published a book, *Teaching Concepts: An Instructional Design Guide* (Merrill & Tennyson, 1977; Merrill et al., 1992), that reported this research. This data provided research support for the beginning development of my instructional design theory.

I was invited to contribute a chapter for the new book series in educational research to be published by the American Educational Research Association. During graduate school, I had a career goal to develop a theory of instructional design. This was the opportunity to write the first paper in this attempt. Richard Boutwell, the second student in our new department, was the co-author of this paper (Merrill & Boutwell, 1973).

We wrote:

Progress cannot be made toward an empirically based instructional development methodology until propositions that relate objectives to learning activities are specified and tested. Two premises are proposed: first instructional outcomes can be classified into a limited number of behavioral classes (the Gagné assumption). The acquisition of a given kind of behavioral outcome can be optimized by the appropriate manipulation of task variables.

This paper described a behavior-by-content matrix that elaborated Gagné's categories for classifying instructional outcomes consistent with the first premise.

Outcomes can be classified into two dimensions: behavior and content. The behavior dimension has four values: discriminated recall, classification, rule using, and higher-order rule using. The content dimension has four values: paired-associate, concept, principle, and problem. The intersection of these two dimensions of the matrix defines ten categories of instructional outcomes. This classification was an extension of the categories first proposed by Gagné.

Consistent with the second premise, task variables included qualitative variables: presentation form, interdisplay relationships, and mathemagenic information (additional or augmenting information used in conjunction with presentation form). Complex cognitive instruction is composed of displays representing one of the following combinations: expository [tell] generality (EG), expository [tell] instance (Eeg), inquisitory [ask] generality (IG), and inquisitory [do] instance (Ieg). The abbreviations were used as shorthand when writing descriptions of a given instructional strategy.

This paper used this content/behavior matrix and the taxonomy of task variables to describe and review several studies of complex cognitive instruction in the current literature. Consistent terminology to describe these important instructional variables facilitated the comparison of studies that often used different and sometimes confusing terminology to describe the investigated variables.

This paper was the first formal attempt to define a theory of instruction. This paper formed the foundation of *component display theory* and *First Principles of Instruction*. This paper became the underlying theory for the TICCIT system and the Courseware Inc. approach to instructional design.

Vic Bunderson and his University of Texas computer-assisted instruction laboratory were granted an NSF grant to develop a computer-based instructional system. Early in the project, the IRD department was added to the project. A bit later NSF decided to consolidate the project at BYU, and Vic and many of the folks in his CAI laboratory moved to BYU and became part of the IRD department.

As a co-director of the NSF project, I suggested that instruction should be built into the system and consist of rules, examples, and practice, the three elements of the instructional design theory ideas that were presented in the "Research in Education" paper mentioned earlier. Harvey Black suggested that rather than control over what to study next or how to study, learners should be given control over their instructional strategy. This would be implemented by giving them a *rule*, *example*, and *practice* button. After they reviewed the rule, they could then request an example or several examples; after they had seen the examples, they could request and try a practice item or several practice items. Creating a system with a built-in instructional design and control over the learning strategy was a very innovative approach to instruction and was unique compared to other attempts to build instructional teaching systems. The system was an application of the instructional design theory that we were developing in IRD.

The instructional theory used by the TICCIT system assumes that any instructional presentation consists of a series of "primary presentation forms" (rule, example, or practice displays) or elaborations of these primary forms (rule help, example help, or practice help). TICCIT lessons are composed of segments that are each designed to teach a concept, procedure, or rule. Each segment consists of a wide variety of display files that can be selected by the student as he or she attempts to master the segment objectives. Together with two other members of the TICCIT team, we co-authored a book on the system that describes many of its features (Merrill et al., 1980).

Simultaneously with the development of this CAI system that implemented my instructional design theory work, I continued formalizing the theory. The theory identified specific instructional events (called primary presentation forms) and propositions that identified the appropriate combination of instructional events for each of the different kinds of learning outcomes. Because we specified in the TICCIT system that these combinations of learning events for a given concept or principle could be isolated as individual screen presentations for the student in this CAI system, we called the theory *component display theory*. I continued to publish this theory development as it progressed (Merrill, 1983, 1987, 1988, 1994).

Charles Reigeluth, one of my students at BYU, published a series of green book anthologies of instructional design theories and models. I felt that the foundation of many of these theories ought to be the same even though their surface features and emphasis varied. I did a careful review of many of these theories to see if there were underlying principles that they had in common. I was also interested to see if the categories of learning outcomes and the learning events associated with these different outcomes that we had

proposed could be identified in these different theories. Based on this review I published the paper “First Principles of Instruction” (Merrill, 2002). As with *component display theory*, I published papers elaborating on the ideas presented in this original paper (Merrill, 2006a, 2006b, 2007a, 2007b, 2009a, 2009b, 2020a, 2022). In 2013, I published *First Principles of Instruction: Identifying and Designing Effective, Efficient, and Engaging Instruction* (Merrill, 2013). In 2020, I published a more concise presentation of first principles as *Merrill’s First Principles of Instruction, Revised Edition* (Merrill, 2020).

The remainder of this chapter is a concise summary of the important concepts and relationships of this latest version of my instructional design theory.

FIRST PRINCIPLES OF INSTRUCTION

Theory construction entails the identification, description, and classification of instructional variables or concepts, both cause (independent variables) and effect (dependent variables), and the formulation of cause-and-effect principles that relate these variables (Snow, 1973). What are these underlying concepts and their cause-and-effect relationship for instruction?

Instruction requires the answer to two questions:

- **What to teach?** What types of knowledge and skill do students need to solve problems?
- **How to teach?** What are the instructional events that promote effective, efficient, and engaging (e³) instruction?

What to Teach

First Principles of Instruction identifies **five fundamental skills** that are the components of complex skills and problems.

Remember associations: recall unique information associated with an object, activity, or process. In this skill, the information and the example are both specific.

Classify concepts: use *properties* to identify the class membership of an object, event, or process. In this skill, the definition or set of properties that are used to identify the concept is the information element. The properties or definition apply to all the examples of the concept. An example is a specific object, event, or process under consideration or a portrayal of a specific object, event, or process.

Execute procedures: do *steps* that lead to a condition or consequence. The information is the names of the steps and their sequence that lead to the consequence. Information is the description or properties of these steps, the example is doing a specific instance of a step or observing the execution or a portrayal of the execution of a specific step. The condition or consequence is the result of the procedure and is usually a change in the properties of some object, event, or process.

Comprehend processes: determine a *consequence* from a set of *conditions*. The conditions are specific objects, events, or processes. The information is the name, sequence, and properties that identify these objects, events, or processes.

Solve problems: identify or create the conditions that lead to a desired consequence or solution. Problem-solving involves a combination of the other four skills.

The what-to-teach premise underlying First Principles of Instruction is that: learning any subject matter content is mastering some combination of these fundamental skills.

How to Teach

An *instructional event* is an interaction between a student and content elements. First Principles of Instruction identifies **four types of fundamental instructional events**: *tell information*, *ask information*, *show examples*, and *DO* apply information to an example or portrayal of an example. The type of information and examples depends on the type of skill being taught.

An *instructional strategy* is a sequence of instructional events. First Principles of Instruction identifies **three levels of instructional strategy**, each of which is a combination of a subset of the four types of instructional events.

Tell alone, while sometimes identified as instruction, is merely presenting information and is not an instructional strategy. *Tell-ask* is the most common but least effective instructional strategy.

The demonstration principle, the first of the five First Principles of Instruction, indicates that learning is promoted when learners observe a demonstration of the skills to be learned. *Tell information-show portrayals* are instructional events that implement the demonstration principle. *Tell-show* is a more effective, efficient, and engaging instructional strategy than *tell-ask*.

The application principle, the second of the five First Principles of Instruction, specifies that learning is promoted when learners engage in the application of their newly acquired knowledge or skill. *DO apply* information to portrayals are instructional events that implement the application principle. Learning from applications is promoted when learners are provided with *corrective* or *intrinsic feedback*. Corrective feedback indicates right or wrong and then explains the response. Intrinsic feedback is a naturally occurring result of some student act that lets the student know if their response was correct or not. *Tell-show-DO* is an even more effective, efficient, and engaging instructional strategy than *tell-ask* or *tell-show*.

CREATING E³ INSTRUCTION FOR THE VARIOUS TYPES OF LEARNING

Having described the four fundamental instructional events and the three levels of instructional strategy, let's discuss how these events and strategies can be employed to create effective, efficient, and engaging (e³) instruction for each of the five types of fundamental skills: remember associations, classify concepts, execute procedures, comprehend processes, and solve problems.

Remember Associations: Guidelines for e³ Instruction

The *remember associations* skill is to recall unique information associated with an object, activity, or process. *Telling information* and *asking information* about some entity, activity, or process are instructional events that implement a remember-association, level 0, instructional strategy. Remember associations play an important role in supporting more effective instructional strategies, but

too often instruction is limited to remember associations. Tell/ask instructional strategies do not implement either the demonstration or application principles.

Remember associations strategies are enhanced when: (1) They are available on *learner demand* in other types of instructional strategies such as *classify concepts*, *execute procedures*, and *comprehend processes* strategies. (2) The instruction allows students to *explore* the items by allowing control over which items to observe and allowing the student to repeat the presentation. (3) Effective remember associations practice requires an immediate response with little or no delay. (4) Learners should be provided with immediate correct-answer feedback for both correct and incorrect responses. (5) Repetition should avoid sequence cues by using a *random order* when the items are repeated. A sequence cue is always presenting items in the same order when the sequence is not the goal of the instruction. (6) Students will be more motivated to practice until mastery if they *compete with themselves* to acquire a higher score each time they practice. (7) Sometimes it is helpful to provide the student with a *mnemonic* to assist in remembering the information. A mnemonic is a memory aid that helps learners remember associations. The presentation should also make the context of the information clear to the student. (8) When nice-to-know information is presented, learners should be told that this is for interest only and that they will not be required to remember this information.

Classify Concepts: Guidelines for e³ Instruction

A *concept* is a class of objects, events, or processes that share specific properties or property values. A *property* is a quality or trait of an object, activity, or process. A *property value* is how much of or the quality of a property. A *defining property* is a property or property value that determines the class membership of a particular object, event, or process. It is sometimes called a relevant property. An *irrelevant property* is a property or property value of an object, event, or process that does not determine its class membership. An *example* is a specific object, event, or process that shows the concept's defining properties or property values; it is a portrayal of the concept. A *non-example* is a specific object, event, or process that does not show all or some of the defining properties or property values of the concept; a portrayal that does not belong to the concept. Corrective feedback is information following a response indicating the correct response and why it is correct.

The *classify concepts* skill is to use properties to identify class membership of an example or portrayal. *Tell properties* and *show examples* are instructional events that implement the demonstration principle for a classify-concept skill. A *DOid example* is an instructional event that implements the application principle for a classify-concept skill.

Classify concepts guidance is provided by matched examples, divergent examples, coaching, multiple examples, and coordinate concepts. *Matched examples* use an example that shows the defining properties paired with a non-example that shares irrelevant properties but does not share some or all the defining properties. *Divergent examples* use a series of examples where the portrayal of the defining properties or property values is different while still defining the concept. The series should reflect the variance in examples that occurs in the real world. Learning from an application is enhanced when learners are *coached* and when this coaching is gradually withdrawn for each subsequent problem. Coaching helps the learner identify the properties in the

example. Classify concepts becomes more reliable as the number of examples increases. A *coordinate concept* is a set of categories that share the same properties but where the individual classes in the set have different values on these properties. For coordinate concepts, the examples of one concept become the nonexamples of its sister concept.

Execute Procedures: Guidelines for e³ Instruction

A *procedure* is a series of actions (steps) that lead to some change in an object, event, or process, also called a condition or consequence. A *step* is an action performed on some object, event, or process. A *condition* is a change in an object, event, or process caused by some step (action). A *procedural sequence* is the order in which steps must be performed to result in a change in a condition. A *DOid* instructional event is to identify the correct execution of a step or an appropriate condition or consequence resulting from the step. A *DOex* instructional event is to perform the correct execution of a step or sequence of steps.

An *execute procedures* strategy is to do the steps that lead to a condition or consequence. *Tell* and *show* steps are instructional events that implement the demonstration principle. A *DOid* instructional event is to identify the correct execution of a step performed by someone else. Identifying the correct execution of a step facilitates executing the step. It is an instructional event that is a prerequisite for *DOex*, doing the step. *DOex* is an instructional event to perform the step in a real or simulated situation. *DOex* is an instructional event that implements the application principle.

This is a checklist for a complete execute procedures strategy. Are parts located, named, and their function identified (*tell/show parts*)? Are the steps and their sequence described (*tell*)? Are learners required to identify the correct execution of the steps (*DOid*)? Is the resulting condition or consequence described (*tell*)? Are learners required to identify appropriate conditions (*DOid*)? Are learners required to perform the steps (*DOex*)? Is corrective or intrinsic feedback provided?

Comprehend Processes: Guidelines for e³ Instruction

A *process* is a series of conditions that lead to some consequence. A *condition* is an object or event that with other conditions leads to the consequence. A *consequence* is a change in the properties of an object or event that follows from a series of appropriate conditions. A *DOid* instructional event is to identify appropriate conditions and the consequence. A *DOex* instructional event is to execute a procedure to create or observe the conditions. A *DOcd* instructional event is to find faulted or missing conditions when there is an unexpected consequence. A *DOcq* instructional event is to predict a consequence from a given set of conditions.

For a *comprehend processes* strategy *tell* and *show conditions* and the *consequence* are instructional events that implement the demonstration principle. *DOid* is an instructional event that implements the application principle. *DOcq* and *DOcd* are instructional events that implement the application principle.

This is a checklist for a complete comprehend processes strategy. Is the consequence described (*tell*) and demonstrated (*show*)? Are learners required to identify an appropriate consequence (*DOid*)? Are the conditions described (*tell*) and demonstrated (*show*)? Is there a *DOcd* instructional event requiring

learners to find missing or faulted conditions? Is there a *DOcq* instructional event requiring learners to predict the consequence from the conditions?

Solve Problems: Guidelines for e³ Instruction

A *problem-solving skill* is to create or observe a desired object, process, or event. A *problem* consists of a set of conditions that create or define the desired solution or consequence and a set of procedures (steps) that create or enable observation of the conditions.

The *problem-centered principle*, the third of the five First Principles of Instruction, specifies that learning is promoted when learners acquire knowledge and skill via a problem-centered strategy in the context of real-world problems or tasks. A *problem-solving event* is an appropriate step that results in an appropriate condition along with the properties of the step and the properties of the resulting condition. A *problem-solving strategy* is a series of problem-solving events that lead to the solution or consequence for the problem.

A problem-solving strategy is a combination of the other three strategies previously identified. The heart of the problem is a *comprehend-process skill*, consisting of the conditions that create or define the desired consequence. One of the challenges of teaching problem-solving is identifying what these conditions are so they can be taught. To solve the problem the learner must be able to identify the conditions in the situation. This is a *classify-concept skill*. They must know and recognize the properties that characterize each of these conditions and recognize faulty conditions (non-examples) when they occur. They must then have process comprehension skills so they can predict (*DOcq*) the consequence from a set of conditions or identify (*DOcd*) faulted or missing conditions when the expected consequence does not occur. Problem-solving involves an *execute-procedure* skill. They must be able to perform the steps necessary to observe or create the required conditions of the problem. A prerequisite for executing these steps is another *classify-concepts* skill. They must be able to recognize the correct execution of the step when it is performed by others, as well as identify the parts of the object that are required to execute the steps. A final problem-solving skill is to identify if the consequence or solution is what was expected or if it is faulted. If it is faulted, then the *DOcd* instructional event should be used to determine why the desired consequence did not occur.

An effective problem-solving skill requires all these component skills to be taught. Too often only the steps are taught assuming that executing the steps will lead to the solution of the problem. However, it isn't the steps that produce the consequence or solution, but rather the conditions that the steps produce that lead to the consequence. Another frequent shortcoming of problem-solving instruction is not including the *DOid* training to recognize the correct execution of the steps before performing the steps.

WHY ARE THESE PRINCIPLES IMPORTANT?

The demonstration and application principles, the instructional events, the categories of skill, and the instructional strategies prescribed by *First Principles of Instruction* are the underlying foundation for effective, efficient,

and engaging instruction. The implementation of these principles can have many variations, they can be implemented in a myriad of ways, and they can be delivered by an enormous variety of live instruction or technology-based instruction. These principles, instructional events, skill categories, and instructional strategies are often implemented without the deliberate effort of the designer. Unfortunately, too often they are not implemented resulting in a decrease in the effectiveness, efficiency, and engagement of the instruction.

Promoting e^3 instructional outcomes is incremental. Implementing the demonstration principle makes a significant difference. Implementing the demonstration principle with the application principle adds another increment in student performance. Adding the problem-centered principle significantly increases engagement in the instruction as well as promotes effectiveness and efficiency.

An additional increment in performance occurs when two additional First Principles are implemented.

The *activation principle*, the fourth of the five First Principles of Instruction, states that learning is promoted when learners activate a mental model of their prior knowledge and skill as a foundation for new skills. Activation is implemented when previous knowledge and skills are activated to serve as a *framework* or organizer for the learner's new knowledge and skill.

The *integration principle*, the last of the five First Principles of Instruction, states that learning is promoted when learners integrate their new knowledge and skill into their everyday life by being required to reflect on, discuss, and defend their newly acquired knowledge and skill. Integration can be implemented by *peer collaboration*, where learners work together in small groups to solve problems. Integration can also be implemented by *peer critique* when learners evaluate the problem-solving activities of fellow learners and provide constructive suggestions for improvement.

CONCLUSION

In this chapter, I've tried to show that an instructional theory consists of only a few basic elements (the three crayons). These elements are instructional events (only four that comprise almost all instruction), types of skill (only five of which almost all instruction is comprised), and the propositions relating instructional strategies (combinations of instructional events) with the acquisition of each type of skill. Further problem-solving comprises a combination of these types of skills and the instructional strategies (combinations of learning events) that promote the acquisition of these skills. My position is that the foundation of all e^3 instruction comprises these fundamental elements.

This chapter is a very concise summary of this theory. You are encouraged to study the articles and books about *First Principles* in the reference list, which provide examples that illustrate the application of and research supporting these principles.

As I approach the end of my career, I feel that *First Principles of Instruction* represents a significant addition to the instructional design literature. I recognize that this is only one attempt to identify a theory of instructional design that underlies all other models and approaches to instructional

design. My hope is that some of you who are reading this chapter and who have studied some of the literature listed in the bibliography will take this work to the next step. More needs to be done to explore how this theory needs to be modified to account for even more of the variance in student performance. More needs to be done to explore the implications of this theory when it is applied in many of the advanced learning technologies, including artificial intelligence.

Finally, I'm grateful for the many students and colleagues who have enriched my life and who have contributed to these ideas throughout my career. Many of you will recognize your contributions. Thank you!

Summary of Key Principles

1. First Principles of Instruction identifies five fundamental skills that are the components of complex skills and problems. These skills are:
 - Remember associations
 - Classify concepts
 - Execute procedures
 - Comprehend processes
 - Solve problems
2. An *instructional event* is an interaction between a student and content elements. First Principles of Instruction identifies four types of fundamental instructional events:
 - *Tell* information
 - *Ask* information
 - *Show* example
 - *DO* apply information to an example or portrayal of an example
3. An *instructional strategy* is a sequence of instructional events. First Principles of Instruction identifies three levels of instructional strategy, each of which is a combination of a subset of the four types of instructional events:
 - *Tell-ask* is the most common but least effective instructional strategy.
 - *Tell-show-ask* is a more effective, efficient, and engaging instructional strategy than *tell-ask*.
 - *Tell-show-DO* is an even more effective, efficient, and engaging instructional strategy than *tell-ask* or *tell-show*.
4. The five First Principles of Instruction are:
 - *Demonstration Principle*: Learning is promoted when learners observe a demonstration of the skills to be learned.
 - *Application Principle*: Learning is promoted when learners engage in the application of their newly acquired knowledge or skill.
 - *Problem-Centered Principle*: Learning is promoted when learners acquire knowledge and skills via a problem-solving strategy in the context of real-world problems or tasks.
 - *Activation Principle*: Learning is promoted when learners activate a mental model of their prior knowledge as a foundation for new skills.
 - *Integration Principle*: Learning is promoted when learners integrate their new knowledge into their everyday life by being required to reflect on, discuss, and defend their newly acquired knowledge and skill.

Application Question

First Principles of Instruction apply to any instruction, designed by any model, and delivered via any technology. Select a module or course. Determine which skills are being taught. Identify the learning events. Are the instructional strategies consistent with the types of skills identified? Is there

problem-solving? Are all components of a problem-solving strategy present? Design the missing components you identify in the course. This chapter is a very brief outline; you may want to consult some of the articles or books in the reference list for examples and more details of the theory.

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The Successive Approximation Model (SAM)

Michael Allen

It's easy to view a process used to create learning experiences, whether technology-based or not, as simply a map for translating design ideas and content into a functional product. But process plays multiple roles and in doing so strongly affects the product produced by it. It balances the often conflicting constraints of time, budget, and resources with the aspirations of designers, goals of instructional effectiveness, ease of delivery, and acceptance by learners. Not a small responsibility. Indeed, our success or failure is determined perhaps more by process than any other single factor.

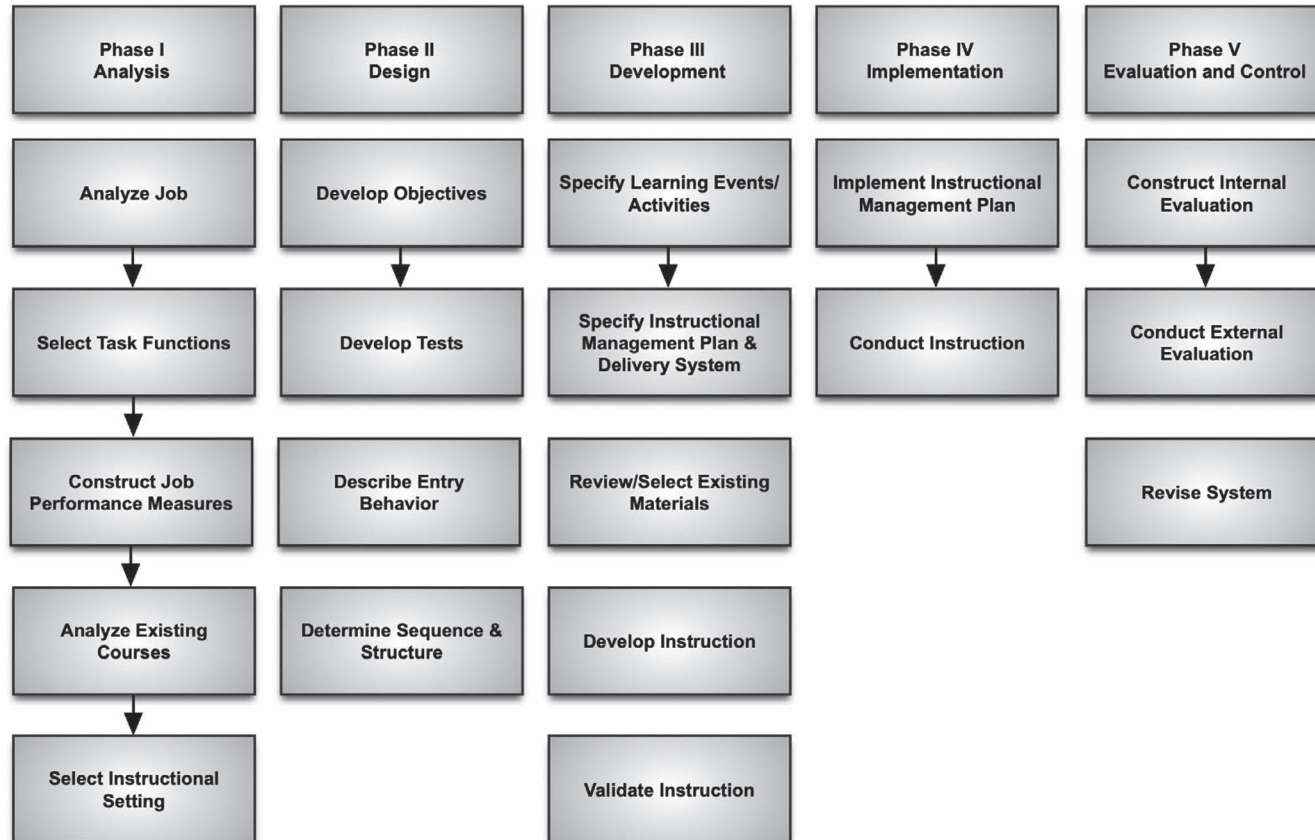
In this chapter, we will look at how a modern process, such as the Successive Approximation Model (SAM), has evolved to meet contemporary opportunities and expectations for managing the process of instructional product design and development.

PROCESS EVOLUTION

ADDIE has been the most popular instructional design and development model of the past several decades. It has evolved through so many permutations that it's now unclear without clarification which ADDIE is in use. As originally conceived, the model was a sequential or "waterfall" model, indicating that each phase was to be completed before the next began. See Figure 5.1.

ADDIE identifies many critical steps to be undertaken to design and create instruction, grouping them into five ordered project phases: Analysis, Design, Development, Implementation, and Evaluation. Completion of each task was originally required before moving on to the next, which classified the process as a "waterfall" process to describe that there was no going backwards or upstream. This made for a clear, regimented, and highly manageable process. If, however, problems were discovered in subsequent work, the realization created

FIGURE 5.1 Florida State University Five Phases of ISD (1975)



Florida State University Five Phases of ISD (1975)

inefficiencies at best and potentially chaos with budget, resources, and schedule overruns.

Decades of experience in the complexity of designing and constructing instructional programs since the origin of ADDIE have taught us that iterative steps to test assumptions and design ideas throughout the process are necessary to avoid heavy investiture in initial design thoughts that prove unfortunate.

WEAKNESSES OF ADDIE

Although various forms of ADDIE differ in their strengths and weaknesses, let's list and review some of the common problems.

1. ADDIE works through documentation.

Specifications documents, even storyboards, are surprisingly easy to misinterpret. Experience has caused many teams to insist, therefore, on rigorous documentation, but being able to see only the description of a learning event rather than see it in action means the design cannot be evaluated on some of its most important attributes. Further, rigorous documentation adds considerably to project costs and slows the process.

2. ADDIE loses sight of the learner experience.

Studying the steps within the phases (see Figure 5.1), the majority of the steps focus on content, sequencing, delivery, and assessment. This is a more suitable view when the instructional approach is primarily one of presentation and testing than when trying to provide active learning experiences. ADDIE tends to focus on scope, sequence, and delivery rather than on learners and the learning experience. Such focus and its impact exemplify the observation that process cannot easily be neutral with respect to the character of the product produced. If we want to produce great learning experiences, we need to focus on what makes experiences instructionally effective. We then shape the content development to fit the needs of the experience rather than the reverse.

3. ADDIE is a meticulously slow process.

Although rapid prototyping is incorporated in some versions of ADDIE, that is not normally the case. Addie is typically a slow and tedious process. In contrast, a process *based* on rapid prototyping places emphasis on the learner experience; it allows for rapid change based upon the experiences of learners. Content is developed as demanded by the experience as it unfolds through iterations. Time and resources are spent experimenting with various ways to engage learners, support alternative decisions and actions they might make, and show consequences of these actions (both good and bad). Examples and counterexamples emerge. Needed demonstrations are identified.

4. ADDIE fails to involve stakeholders.

An important aspect of many projects is achieving the continuing support of stakeholders, including prospective learners. With ADDIE, it is common to conduct analyses, write design specifications, and

perform considerable amounts of work before a clear, testable version of a prospective design becomes available. Thus it's easy for stakeholders to be surprised at their first view of the emerging instruction – even if they've approved documents leading to the product finally at hand. Unfortunately, much of the project time and budget is spent before any learner interactions can be observed and any learner can give feedback. ADDIE projects are at considerable risk if stakeholders are displeased or if learners respond quite differently from expectations.

5. We need a simpler model.

We need a simpler and yet more effective model. We need a faster and more collaborative model. We need a model that fosters creativity, that's practical. A model that focuses on the learning experience and assures the achievement of identified performance outcomes.

THE SUCCESSIVE APPROXIMATION MODEL (SAM)

The Successive Approximation Model (SAM) focuses intensely on the construction of learning experiences, giving attention to relevancy by the learner, readiness, emotions, authentic activity, and needs. It is fundamentally iterative and exploratory to allow alternative designs to be considered very early in the process. It even looks for learner input from the start and throughout the design process. ADDIE tasks are integrated throughout SAM, but are limited to addressing identified project needs rather than attempting broad, time-consuming thoroughness without clear justification and usefulness (see Rossett, 2009).

SAM is much less daunting than ADDIE, sharing many concepts with Agile – a software development methodology in which requirements and solutions evolve through collaboration of and repeated considerations from cross-functional teams. Scope is kept small and focused so an initial implementation can be made functional quickly. Functionality is then maintained throughout the remainder of the process as additional capabilities are identified, added, and evaluated. Consistent with Agile principles and experience, SAM is fast, practical, and responsible for producing many outstanding, award-winning courses of instruction within given constraints.

So how does SAM achieve all these benefits? Let's overview the process and discuss key principles and activities.

KEY PRINCIPLES OF SAM

Iteration

The model's name reveals two essential concepts. First, "successive" tells us that tasks are done in a prescribed order and repeated. Indeed, a foundation of SAM is that several attempts to design and build an effective learning experience are more likely to yield a successful one than is a single attempt. We can have much greater confidence in our design when we consider several designs, even if we ultimately go with our first one.

Approximation

No design is perfect and never will be; improvement is always possible. Therefore, any given design is only one approximation of the theoretical ultimate design. Through iterations, we attempt to get closer to perfection, but if an attempted improvement fails, falling back to a previous iteration is always an option. The revision attempt may well provide substantiating data for the previous design and the effort can properly be deemed a step forward.

Practicality

Successive approximations are *repeated attempts to achieve closer proximity to perfection* (without expecting to actually achieve it). Not expecting to achieve perfection provides great relief and suggests comforting pragmatism. Since perfection is an unrealistic goal, the number of iterations one should undertake becomes a simple, practical consideration. Experience suggests that three iterations usually return substantial benefit, while further revisions, especially before field testing, return some additional but less consequential benefits.

Flexibility

The iterative nature of SAM allows it to adjust readily to project variables and even to major changes to initial assumptions, such as who should be trained first, what form of delivery will be used, the instructional approach, and the amount and type of media to be used. Indeed, because the process constructively questions everything to attain the most impact, the ability to accommodate in-process changes efficiently is essential. Small steps and frequent iterations permit SAM to respond efficiently when problems and opportunities arise.

LITTLE SAM – SMALL PROJECT MODEL

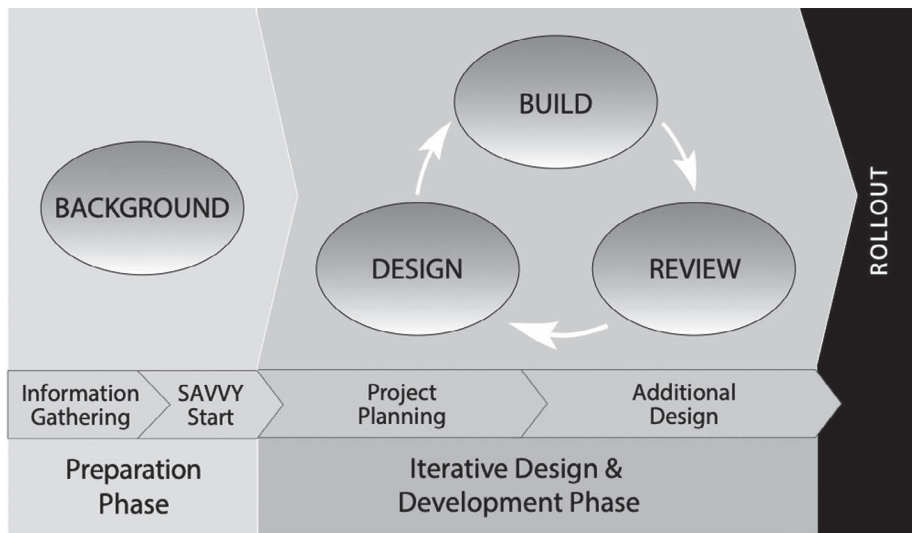
In projects undertaken by smaller teams, one up to about five individuals, most of whom have both design and development skills, there is great benefit from using this simple two-phase process, which includes and exemplifies all the key principles of SAM (see Figure 5.2).

PHASE 1. PREPARATION

Information Gathering

During information gathering, the team does preparation work quickly, taking paths of least resistance. This approach differs from the start of a traditional ADDIE process, in which much time is often spent collecting potentially relevant information that may or may not turn out to be very helpful. Because so many dynamic forces interplay in determining what people do and when they do it, the deeper one probes the more one can see opportunities to investigate further. This never-ending cycle can cause “analysis paralysis,” which can cause problematic delays.

FIGURE 5.2 Little SAM



In contrast to ADDIE, SAM tries to avoid analysis delays and unnecessary efforts by considering alternative instructional treatments and asking, “Why shouldn’t we do this?” The resulting discussion quickly reveals unknown and significant factors and pragmatically identifies those questions worthy of research. When more information is needed, the team goes after it with a clear purpose and justification.

When implementing SAM, it is especially important to avoid articulating content this soon. While existing materials may prove valuable and useful, in this first phase, SAM suggests simply noting what materials exist and moving on to quickly propose what the outcome goals and *key performance issue(s)* may be.

Primary information to gather includes:

- **Identifying key players and their commitment to participate.** Key players include:
 - Decision and budget maker
 - Opportunity owner
 - Subject matter expert (SME)
 - Performance supervisor
 - Recent learners
 - Target learners
 - Training deployment manager
- **Identifying the organization’s primary opportunity** and its dependence on specific behavioral changes. For example, an aircraft manufacturer has the opportunity to improve performance among its employees in handling safety issues to reduce risk of injury or death, but this opportunity depends on learners willingly engaging in learning and changing their behavior, which prior training has not accomplished.
- **Additional information to be gathered, if possible, includes:**
 - Previous performance improvement efforts (if any) and their outcomes
 - Programs currently in use (if any)
 - Available content materials

- Who owns the responsibility for training in the organization
- Constraints, such as schedule, budget, and legal requirements
- Definition of project success

For speed and efficiency, the preparation phase is completed quickly. Background information is gathered to establish initial goals; learn about previous programs, if any; and constraints, such as deadline for rollout, availability of subject matter experts, and budget. This information will inform following discussions on the perceived performance problem that appears to be preventing attainment of the ultimate goal.

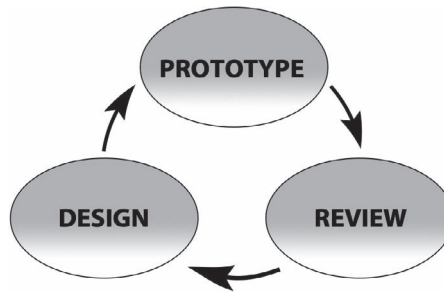
THE SAVVY START

Once preliminary data are gathered, the preparation phase moves to the *Savvy Start* – a brainstorming event in which the design team and key stakeholders review the collected background information and generate initial design ideas. Table 5.1 lists the participants and responsibilities needed in the Savvy Start.

TABLE 5.1 Savvy Start Roles and Responsibilities

Role	Responsibilities
Budget maker	This person can explain budgetary constraints and what assumptions have been made.
Person who owns the performance problem	This person will help to determine the organization's expectations for successful performance and how it will be measured.
Person who supervises the performers	Supervisors are closest to the actual performance issues and will provide the most concrete examples of performance problems that need to be solved.
Subject matter expert (SME)	This person can detail content and its interdependencies, noting what's essential and what's just "good to know."
Potential learners	These people can share a novice's perspective that is invaluable to creating experiences that meet learners where they are.
Recent learners	Recent learners can help the team understand the strengths and weaknesses of current instruction, what is easy and hard to learn, and what may be best to learn on the job.
Project manager	The manager directs resources and schedules project work, making sure effective communication occurs.
Instructional designer	The designer(s) will advise the team on which instructional approaches are effective when, select or create instructional treatments to be considered, and oversee content creation.
Prototyper	This person will sketch and/or build prototypes to give the team the opportunity to visualize their ideas as they evaluate alternatives.

FIGURE 5.3 Savvy Start iterations



Brainstorming is seeded by considering first the solutions stakeholders may already have in mind. From these initial ideas, instructional events are brainstormed, sketched, and even prototyped quickly. The team then reviews the strengths and weaknesses of each alternative.

The Savvy Start meeting is an iterative process of review, design, prototype, and review. As shown in Figure 5.3, Savvy Start iterations of reviewing, designing, and prototyping are performed very quickly – over just hours rather than days. The instructional designer helps clarify the ideas being shared, points out strengths and weaknesses, guides the group toward approaches known to be effective for specific types of learning outcomes, and sketches alternatives for discussion, perhaps following David Merrill’s *First Principles of Instruction* (Merrill, 2020), which integrate beautifully with SAM. One or more sketches are then given to a rototype (a designer/developer who can quickly build functional prototypes of the sketches) to develop, perhaps as the group continues its discussions or during a break. As soon as possible, the prototype is presented to the group for their review. With proper tools and experience, prototypes are produced repeatedly and reviewed within the Savvy Start. The cycle is repeated as many times as possible during the meeting.

During a Savvy Start, a variety of ideas and preferences surface, the need for research and more information may become apparent, and attractive instructional approaches emerge. Different approaches will need to be thoughtfully considered and refined, and possibly modified extensively – even replaced. Attendees should expect this to happen and recognize it as a sign of progress.

Duration

The Savvy Start session may take only one day but may take as many as three full days or even longer. The optimal length depends on many factors, such as the diversity of opinion among stakeholders, the complexity of the skills and behaviors being taught, variance in learner readiness, and so on. Sessions may be spaced apart to give prototypers the time they need or to accommodate incidental factors, such as the availability of people or a meeting space. It’s important to achieve as much as possible while the group is convened, as insufficient consensus can cause severe disruptions downline.

PHASE 2. ITERATIVE DESIGN AND DEVELOPMENT

The iterations in the Savvy Start and continuing to meet with the whole team could eventually produce the final product, but working in this way is rarely practical except for some research situations. To deliver a usable product as quickly as possible, the team is reduced to designers, subject matter experts, and developers in the second phase, as shown in Figure 5.2, but the process remains the same. Pragmatic limits, such as three review, design, and prototyping cycles are not only necessary constraints but also produce products superior to those of one pass or waterfall processes.

Project Planning

Based on the designs created or selected in the Savvy Start, the team can create an informed project plan that has integrity. The team can estimate content writing, media development, and programming for the overall project plan and produce a budget.

Project planning should reflect the essential “successive approximations” concept in SAM that no project ever becomes perfect but through repeated work can evolve and become closer to perfection. This notion lends a great deal of practicality; it urges project managers to put projects into use and think of making future iterations based on feedback from the field. The point relevant to planning is that by quickly producing a first-round project and then planning for successive improvements as time allows, there can be more certainty of project availability on a preset date than with other approaches.

From the time functional prototypes are available, SAM projects always have usable courseware, although incomplete and probably faulty in some respects. Its quality will continually increase with successive approximations, but at any point that it may become necessary to deliver instruction, the best product possible at the time will be there.

For ultimate practicality, as the team plans project tasks, each task is given a level of priority for each iteration:

TASK PRIORITY PER ITERATION

Threshold:	Must be completed in the current iteration
Target:	Is expected to be completed in the current iteration
Future:	Will be held back for a future iteration
Epic:	To be considered after the current project has been put in use

Guidelines for Project Planning Tasks

At the point at which SAM calls for a project plan to be generated, critical information is at hand that would otherwise require risky project planning assumptions. Since there are always pressures to answer such questions as *How much will it cost?* and *How quickly can it be built?* before this point, it’s very helpful to have reviewed at the very start of the project and with everyone how SAM works and when the project plan will be generated.

Some important project planning tasks that help SAM succeed include:

- Capture discussions and decisions by preparing and circulating a detailed *Savvy Start Summary Report*.

- Prepare initial *media and content style guides*. These guides are likely to be incomplete until additional design cycles have been completed. It's easy and efficient to capture additional style preferences as the team becomes aware of them.
- Prepare an initial draft of a *content development plan* that indicates responsibilities and estimates of which material(s) will be needed. Prioritize items by threshold, target, and future.

The biggest risk in project planning lies with learning and performance objectives for which no solutions have yet been prototyped. So, additional design work needs to commence immediately.

Additional Design

Additional design activities are identical to the design – prototype – review events of the Savvy Start and often occur concurrently with project planning to maintain project momentum. For example, in the Savvy Start, the design team for an aircraft manufacturing company was only able to prototype five of the nine design treatments required. The reduced core team prototyped the remaining treatments after reviewing existing prototyped treatments to assure design and cost consistency.

Breadth Before Depth

The rule of *breadth before depth* is a response to the temptation to iterate too much in one area of content, using up so much time and resources that other topics will suffer. Inconsistencies and lack of completion are two likely outcomes of this fault. The team benefits greatly from considering all the content at a reasonable depth to understand whether a broad variety of instructional treatments will be necessary or if just a few will suffice.

The breadth before depth rule is harder to follow than it appears and can actually be the biggest liability of using SAM. With each iteration, design becomes more articulated and reaches greater depth. It will also introduce new possibilities not previously seen. The team will be tempted to follow up immediately on ideas as they surface, feeling that it's efficient to continue iterations, building on ideas while they are fresh and to "complete" the design. The problem is that new, "better" ideas are likely to emerge from *every* iteration. It takes professional discipline not to pursue them in favor of leaving sufficient time and attention for remaining content.

Generally, no content area should receive more than three iterations until all types of content have received similar attention. One very important benefit of considering all content before polishing any one treatment to its final level is discovering the possibility of a powerful treatment appropriate to multiple if not all content topics. This satisfying discovery avoids having to build many unique treatments and permits greater refinement to a smaller set.

The initial task, therefore, is to scan through all the content and design first-round instructional treatments for each new type of content encountered. The project manager can then decide if there is time to iterate further on some or all of the designs. Very often, there's less time remaining than expected. But covering all the content initially at least ensures a deliverable product.

Prototypes

Prototypes continue to be important throughout design work to communicate and test ideas. A usable prototype is better than any description, specification, or storyboard. It substitutes for many pages of documentation that can be time-consuming to both write and read. In contrast, a prototype communicates by example, making it easy for people to understand, ask constructive questions, and make detailed comments.

Following the Savvy Start, where prototypes are focused on achieving consensus on design principles, the team may find developing additional prototypes, including some special purpose prototypes, to be of great value.

Special Purpose Prototypes

- **Media prototypes** integrate media elements to demonstrate the desired “look-and-feel.” Layout, colors, fonts, images, and samples of other elements are brought together to form a clear design example and set criteria for full product development.
- **Functional prototypes** are derived by enhancing prototypes created during the Savvy Start to make them usable by and testable with learners. Functional prototypes provide navigational and interactive elements so learners can move through and complete the activities successfully.
- **Integrated prototypes** combine functional and media prototypes with sample content to provide a complete, representative sample of the product design.
- **Technical prototypes** are created to test delivery platform compatibility, communication with a learning management system, or any technical or design components that instructional delivery will depend upon.

BIG SAM – LARGE PROJECT EXTENSION

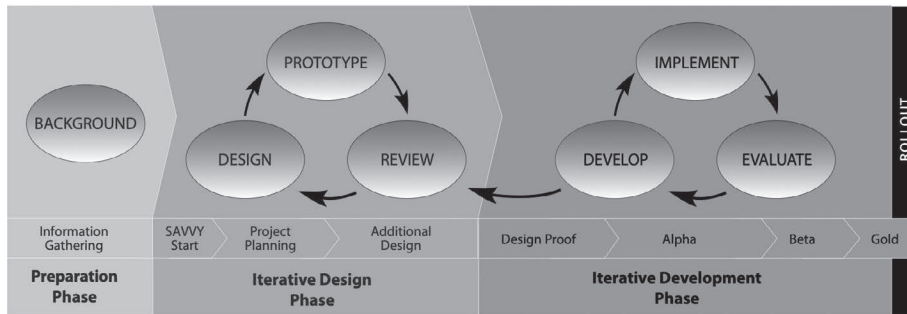
In many ways, “Little SAM” is an ideal model and the recommended process whenever it’s possible to use; however, more structure is required when projects are larger, more people are involved, and more money is at risk. Planning for larger projects is typically more extensive; special purpose prototypes are often required to keep all design attributes consistent, and development is usually less integrated with design. A formalized approval process becomes important.

The Iterative Development Phase

With Little SAM, prototypes evolve into the final product, iterating until either time and money have expired or the instructional product achieves acceptance criteria. In university settings, it’s not unusual for iterations to continue for years with courses updating and improving for successive waves of students. In many ways, this is ideal.

The iterative development phase, depicted in Figure 5.4, is added more frequently for commercial production when constraints are finite, and the goal is achieving the best possible by a fixed date and within a preset budget. Instead of the design team evolving prototypes into the final product, prototypes and feedback along with outlines of additional content to be developed

FIGURE 5.4 Three phase SAM



are passed on to a development team to take them the final step. Production of scripts, media, LMS interface, and more is undertaken by specialists working concurrently to speed up production.

The iterations that are so advantageous to the design phase process are equally powerful for development phase activities. Iterations allow stakeholders to have a continuing means of in-process review and making in-budget corrections that would be costly later. The pragmatic value of this advantage cannot be overstated.

Design Proof – A Critical Link

When design and development are formally separated, communication of design decisions to the development team is a potential point of trouble. Prototypes are, again, invaluable to SAM as, better than verbal documentation alone, they convey much of what developers need to know. The design team is responsible for providing a set of prototypes for each type of content and demonstrating desired user interface, media integration, and other components. Working closely with the development team, a first slice of the final product is created called the *design proof*. It's a means to ensure all the components will work together as expected. The *design proof* is a visual, functional demonstration of the proposed solution that is still early enough in the process to make corrections which could well be prohibitive if not discovered until more development work had been completed. It integrates samples of all components and operates on the final delivery platform to test and prove viability. It is built with the same tools that will produce the final deliverable. In this way, the *design proof* not only tests the viability of the design, but also the production system.

Approval or disapproval will determine whether:

- Additional design work needs to take place. If so, the process returns to iterative design to produce needed designs.
- Another development iteration should take place to make corrections.
- Iterative development can proceed to producing an alpha version of the final product.

If technology is involved, the *design proof* needs to run on the equipment and network to be used by learners and demonstrate functional communication with the learning management system (LMS), if one is to be used. If the *design proof* includes role playing, field demonstrations, or other activities, the

team needs to conduct trial runs of these activities to be sure all details have been incorporated to make these activities run smoothly.

Alpha Release

The *alpha release* is a complete version of the instructional application to be validated against the approved design. By this point, the team should have implemented all expected content and media. No major, undocumented issues are expected to be found, but it's nevertheless common for them to surface despite everyone's best efforts.

Evaluation of the alpha release identifies deviations from style guides, graphical errors, text changes, sequencing problems, missing content, lack of clarity, and functional problems.

Beta Release

The beta release is considered to be a gold release candidate. It is a modified version of the alpha release that incorporates the needed corrections reviewers identified during alpha release evaluation. At this point, if any errors remain, they should include only typographical errors or other minor items.

If the team made all alpha release corrections as expected, the beta release automatically becomes the gold release ready for rollout.

Gold Release

Construction of the gold release is the final stage in the iterative development phase. At this point, while no project ever reaches perfection, the courseware becomes fully usable within the parameters of previously approved project guidelines.

LEAVING ADDIE FOR SAM

A final note: How do people accustomed to ADDIE switch to SAM? Should they dive in or put a toe in first and walk in gradually? What works best?

I've pointed out that SAM requires performance of almost all tasks identified in ADDIE, the difference being the order in which they're performed and the context surrounding them (Allen, 2012). It does not depend upon a high degree of perfection in the initial performance of each task, but rather continually examines progress in light of the learning experience that is emerging.

The differences between the two processes are such that fundamental notions of SAM are handicapped if, from the very start, the focus isn't on the learning experience. How do we want learners to feel, react, and act as they experience the course we're setting out to create? What content to we need to expose? When do we expose it and under what circumstances? How do we let or even encourage learners to make mistakes to see the consequences, either good or bad, of their actions? How do we make practice authentic and transferable to real-world application? These are the questions that SAM naturally engenders almost precisely because of the sequence of events (Allen, 2016).

So, continuing the analogy of wading versus diving in, taking small departures from ADDIE in an attempt to tap a few of the advantages of SAM feels more like clinging to the diving board. You might never even get wet. To practice diving, you really need to let go and jump in!

Summary of Key Principles

1. **The legacy ADDIE (Analysis, Design, Development, Implementation, and Evaluation) process has become a family of processes due to the many adaptations made to overcome its weaknesses. The number of ADDIE adaptations and resulting models has proliferated to a point of indistinction.** For example, as a typically document-based process, misinterpretation of documents inevitably led to problems. While it identified important tasks to be done, it was also slow, cumbersome, and complicated – all qualities that stifled much-needed creativity and focus on the learner experience.
2. **SAM was created to overcome problems identified from many years of experience with ADDIE.** SAM evolved based on frustrations with ADDIE, such as its time-consuming nature and tediousness, while often producing boring content-focused instruction. The importance of creating learner experiences that are effective, efficient, and engaging cannot be overstated and should be the starting point of design rather than tacked on. Consistent with today's Agile concepts for software development, SAM emphasizes the importance of operational prototypes and minimizes the use of documentation that is too easily misinterpreted.
3. **SAM is an efficient model optimized through the elimination of unneeded tasks and performing tasks at optimal times and levels.**
4. **SAM focuses on targeted outcome performance on problems learners will need to be able to solve, providing authentic practice to mastery.** The goal is to produce highly beneficial learning experiences, not to check off a long list of design and development tasks.

Application Questions

1. The VP of sales at a custom furniture company feels that while their training of new salespeople is about the best it can be, having refined it over decades, it remains a slow and costly process. After five weeks of classroom training, trainees still falter on the job, sometimes damaging permanently any future prospects with clients. She has set aside an undisclosed budget to develop new training to be rolled out in ten weeks and wants you to lead the development using the SAM process she's heard good things about. After collecting some background information, you've learned that the director of training has been urging the company to develop e-learning so that the more experienced salespeople can get into the field faster while those needing more skill development get the training they need. But the sales VP has been arguing that they simply need to record some of their best salespeople in action and give everyone access to the videos.

- a. List the background information you would try to collect before a Savvy Start.
 - b. List, by talent, knowledge, and/or responsibility, who should attend the Savvy Start.
 - c. Someone suggests you start reviewing specific sales skills that are currently being taught. Do you agree or disagree? Why?
 - d. What do you do if the VP of sales and the training director attend and disagree about whether the training should be a series of videos or e-learning?
 - e. Describe what might happen if you let unexpressed differences go unexplored at the Savvy Start.
 - f. You see some very good ideas accepted by the group but realize they would be expensive. Do you raise this concern in this meeting? Why or why not?
2. Imagine you have completed most of the two days allowed for a Savvy Start and the group has reviewed several prototypes, noting likes and dislikes in each. How would you handle the following situations?
 - a. A completely new idea arises that everyone seems to like.
 - b. You've been able to cover about 20% of the skills learners need to develop. What do you tell the group about how the other 80% might be covered?
 - c. You see some very promising elements in the designs people like, but also some pitfalls that need to be addressed. How do you handle them?
 3. An organization that certifies cafeteria food workers wants cooks to place foods in refrigerators to minimize spoilage. Cooks must apply the knowledge of interactions that can occur between foods kept in refrigeration and how they can be prevented.
 - a. Sketch a learning experience that would lead to satisfactory performance and, via roleplaying, discuss with one or more other people to get their reactions.
 - b. Sketch a second learning experience responding to comments and suggestions you received, but also trying out a very different approach than you used the first time. Discuss with others, including someone who might well take the training.
 4. Identify a performance improvement goal for which an organization might want to develop interactive instruction.
 - a. Write a detailed verbal description of a primary learning interaction you think would be appropriate. Give it to one or two people and ask them to comment on it.
 - b. Sketch the same interaction. Show and discuss your sketch with one or two people.
 - c. Compare the type and value of the feedback you received and also note the amount of time you and reviewers spent in total for each approach, beginning with when you began writing or when you began sketching.

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SECTION **III**

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**Theories and Models of
Learning and Instruction**



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Psychological Foundations of Instructional Design

Marcy P. Driscoll and Kerry J. Burner

This chapter provides an overview of the major psychological concepts and principles of learning that are foundational to the field of instructional design (ID). Most people have an intuitive notion of what it means to learn – they can do something now they could not do before, or they know something now they did not know before. Learning happens throughout life. Sometimes it's simple and occurs with relative ease, as when you learn a new function on your smartphone by looking it up on the web browser and trying it out. Other times, learning is difficult, requiring instruction, modeling or coaching, and lots of practice. Complex skills such as ballroom dancing, playing a musical instrument, or piloting an aircraft fall into this category.

But learning must be distinguished from human development, or maturation, which also leads to abilities that were not present before. For example, young children are soon able to grasp objects in both hands simultaneously as they develop muscular control and coordination. Human development occurs as a natural process whereby “everyone, barring those with serious disorders, succeeds and succeeds well” (Gee, 2004, p. 11). Familiar examples of human development include learning to walk and learning one's native language.

Changes in ability that are only temporary must also be distinguished from learning, because learning implies a kind of permanence. Thus, the increased abilities of an athlete taking a performance-enhancing drug would not be thought of as learning.

Finally, some scholars make a further distinction between learning as an instructed process and learning as a cultural process (Gee, 2004). People learn many things by virtue of the cultural group to which they belong, such as social norms, rituals, and games. These are not typically the goals of instruction, whereas school subjects such as learning calculus or physics, are. And instruction and learning are what instructional designers care most about.

In most psychological theories, learning is defined as “a persisting change in human performance or performance potential” (Driscoll & Burner, 2022, p. 9), with performance potential referring to the fact that what is learned

may not be demonstrated immediately. Indeed, you probably remember many instances in which you never showed what you had learned until you took a final test or submitted a final project. It is important to note, however, that such demonstrations of learning are important for instructional designers to establish the effectiveness of instruction. How else can they determine the impact of instruction if they do not, in some way, ask the learners to perform what was to be learned in the first place?

Learning is defined further by how it is thought to occur. In most psychological theories, learning comes about through “the learner’s experience and interaction with the world” (Driscoll & Burner, 2022, p. 9), and this interaction is generally understood as an individual process. That is, the individual interacts with the world surrounding them, and this experience leads to an increased ability to perform in a particular way. A focus on the individual learner is why there has been such interest historically in differences among individuals and why the performance of individual learners is assessed after instruction. What differs among learning theories is how they describe the observed outcomes of learning and how they explain the learning process. Some of these differences are described in later sections of the chapter.

In recent years, perspectives have emerged that call into question the individuality of learning. Adherents of a sociocultural view believe that “[psychological] individuality can only be properly identified and analyzed after the levels of community have been factored out” (Lemke, 1997, p. 49). In other words, learning is to be understood in terms of the activities of people living within a particular sociocultural setting. In this view, learning is more than a change in performance of a single individual; it can encompass the performance of a group of individuals sharing a common purpose or intent or engaged in a common practice. Furthermore, learning is characterized not just by the processes within an individual learner but also by the processes shared by and affecting the members of a defined group. It is in this perspective that learning as an instructed process begins to merge with learning as a cultural process.

Digital technologies offer a means to take social learning a step further, reflecting a rapidly changing society that is “more complex, connected socially, global, and mediated by increasing advancements in technology” (Duke et al., 2013, p. 6). Connectivism is a theory that attempts to address organizational knowledge that can reside outside the individual. Learning becomes a process of connecting ideas, evaluating diverse information sources, and deciding what is relevant or important to make knowledge actionable (Siemens, 2005). In the connectivist view, learning may begin with the individual, but knowledge can grow exponentially as individuals collaborate within a network and constantly update information. In this view, an individual’s existing state of knowledge is less important than the ability to connect within a network, and it is advancing technology that makes these connections possible.

In the sections that follow, major psychological concepts and principles of learning are explored and their implications for ID discussed. In some cases, such implications have already been observed as influences on the field. In others, implications are being imagined and proposed as potential and future influences on the field.

BEHAVIORAL LEARNING THEORY

Throughout his life and career, B. F. Skinner advocated an approach to the study of psychology and learning that focuses on behavior (see, for example, Skinner, 1938, 1969, 1987). At the core of his radical behaviorism was Skinner's belief that learning can be understood, explained, and predicted entirely based on observable events, namely, the behavior of the learner along with its environmental antecedents and consequences. Antecedents refer to the cues that signal the appropriateness of a given behavior. A stop sign, for example, signals to the driver that the appropriate behavior is to apply the brakes. Likewise, a teacher's admonition to "listen up!" signals to learners that they should stop talking and pay attention. According to Skinner, the consequences of a behavior then determine whether it is repeated and thus considered to be learned. For instance, a learner who is rewarded with a teacher's smile for paying attention in class will be more likely to follow the teacher's direction at a later time than one whose behavior goes unnoticed. Similarly, a learner who tries a new strategy for finding information on the internet is more likely to keep using it if it proves to be successful (and thus is reinforced) than if the strategy does not yield the sought-for information.

The principles of behavior modification that Skinner and his disciples investigated in their research and tried out in instructional applications have had significant impact on the ID field. To begin with, behavioral learning theory is empirically based. This means you observe behavior both before and after implementing an intervention, and you relate the changes in performance you observe to what happened during the intervention. If behavior doesn't change, then the intervention cannot be considered effective. In the ID field, these observations are part of formative evaluation, which is conducted to collect information about whether instruction resulted in learning and how it might be improved to result in even better learner performance.

The emphasis in this theory on the behavior of the learner also contributed concepts such as behavioral objectives and the importance of practice and feedback in instruction. Computer technologies make it possible to provide individualized instruction that directs learners to unique content and customized practice based on what they show they've learned. For example, online training programs for cybersecurity and personnel policies that are based on behavioral theory enable employees to learn on their own schedules and at their own pace.

While Skinner's behaviorism demonstrated the power of reinforcement on learning, the new behaviorism reflected in John Staddon's work helps to explain why learners may not learn the same things when they've experienced the same instruction, practice, and feedback (Staddon, 2014). He states that all learners have extensive and unique reinforcement histories through their life experience, which will affect future learning. Staddon also explores how behavioral theory can create conditions to facilitate learners' manifestation of new and creative behaviors.

COGNITIVE INFORMATION PROCESSING THEORY

Cognitive information processing theory rose to prominence among psychologists in the 1970s. Like behavioral theory, information processing

theory regards the environment as playing an important role in learning. Where information processing theory differs from behavioral theory, however, is in its assumption of internal processes within the learner that explain learning.

The birth of computers after World War II provided a concrete metaphor for thinking about learning and a consistent framework for interpreting early work on memory, perception, and learning. Stimuli became inputs; behavior became outputs. And the associations that happened in between were conceived of as information processing.

(Driscoll & Burner, 2022, p. 70)

Atkinson and Shiffrin (1968) proposed a multistage, multistore theory of memory that dominated information processing theory for the latter part of the 20th century. This theory, now called the “modal model” (Atkinson & Shiffrin, 2016), focused on both structural and process components of memory. That is, cognitive processes in three memory systems in the learner (sensory, short-term, and long-term memory) act on information from the environment and transform it for storage and use in retention and performance. With sensory memory, learners perceive organized patterns in the environment and begin the process of recognizing and coding these patterns. Short-term or working memory permits the learner to hold information briefly in mind to make further sense of it and to connect it with other information that is already in long-term memory. Finally, long-term memory enables the learner to remember and apply information long after it was originally learned.

Information processing was thus thought to be linear in nature, with information passing through stages of memory and different processes coming into play at each stage. For instance, attention assures that information to be learned is received in the first place. To be most influential on learning, attention must often be directed so that learners heed specific aspects of what they are being asked to learn. Similarly, encoding enables learners to make personally meaningful connections between new information and their prior knowledge. Finally, retrieval makes it possible for learners to recall information from memory so they can apply it in appropriate ways.

Recent evidence suggests that information processing is not as linear as first supposed and that working memory does all the heavy lifting of information processing. In Cowan’s revised model (1988, 2014), familiar aspects of information can activate perception nearly automatically, while attention can be strategically focused on both internal and external stimuli. This helps to account for thinking as well as attentional differences among learners and the way they approach certain tasks.

Information processing theory shifted our focus to various attributes of instruction and how they can facilitate or impede information processing and, thereby, learning. It also put increased emphasis on the role of prior knowledge in learning new knowledge and skills. For instance, a learner who already knows a good deal about a topic can call to mind many cues that will be helpful in processing whatever new information is presented during instruction. A learner with little prior knowledge, however, can make few connections between what is already known and what they are being asked to learn.

To assist learners in processing information, practitioners have incorporated strategies into their instructional designs that direct attention, facilitate encoding and retrieval, provide practice in a variety of contexts, and enhance learners' control of their own learning processes. The use of boldface and italic print in text materials, for example, can draw learners' attention to important information just as the use of color in diagrams or slides can help learners distinguish important features of visual information. Graphical diagrams and imagery strategies can help learners make meaningful connections between their prior knowledge and the new information they are learning. Finally, providing different kinds of examples or problems and prompting learners' reflection on what works in different contexts can help them both identify and apply the knowledge they are acquiring to situations where it is relevant.

SCHEMA THEORY AND PRIOR KNOWLEDGE

What distinguishes experts from novices in the way they structure knowledge and solve problems? Questions like this have prompted developments in learning theory that, while still cognitive in orientation, diverge from information-processing perspectives. According to schema theory, knowledge is represented in long-term memory as packets of information called schemas. Schemas organize information in categories that are related in systematic and predictable ways. For instance, a person's knowledge or schema of "zoo" may encompass categories of information such as the kinds of animals residing there, the types of habitats in which the animals are exhibited, programs to engage and inform the public, and so on. Learners use existing schemas to interpret events and solve problems. They also develop new and more complex schemas, as well as correct misconceptions, through experience and learning. Those who have never been to a modern zoo, for instance, may have an incorrect (or incomplete) schema about animals being kept in confined cages.

Learning in schema theory consists of adding information to existing schemas, restructuring old schemas to create new, more powerful understandings, and generalizing schemas in adaptive ways to be able to use knowledge in a flexible fashion. From the perspective of schema theory, the anticipated outcome of learning is expertise, that is, coherent, well-integrated, principled knowledge.

Automation is important in the construction of schemas, because learners have only so much processing capacity. More sophisticated and automatic schemas free a learner's working memory capacity, allowing processes such as comprehension and reasoning to occur. However, learners can still fail to use appropriate prior knowledge because they overgeneralize a schema, not realizing they have a misconception, or perhaps through lack of interest, they don't bother to pursue opportunities to apply prior knowledge where it is relevant.

Developing expertise, particularly in a subject matter domain, is the aim of the Model of Domain Learning (Alexander, 2017). Alexander set out to determine what distinguishes novices from experts and what it takes for learners to acquire the depth of knowledge and strategic processes that characterize experts. She described three stages of developing expertise: *acclimation* (becoming oriented to subject matter), *competence* (acquiring more accurate schemas and normative understandings in the discipline), and *proficiency* (using deep-processing strategies and seeking to generate new knowledge).

Learners' journeys through these stages toward expertise can be facilitated in several ways. Well-organized instruction provides cues to activating and elaborating prior knowledge and is especially beneficial to learners at the acclimation stage. As learners gain expertise, they benefit from instructional strategies that highlight conflicts in their conceptual understandings, provide explanations that refute misconceptions, and engage them in critical evaluations of evidence.

SITUATED LEARNING THEORY

Whereas the context of learning is recognized as important in information processing theory and in schema theory, it takes on a central and defining role in situated learning theory. Unlike the theories we have discussed so far, situated learning theory relies more on social and cultural determinants of learning than it does on individual psychology. Specifically, knowledge is presumed to accrue in "meaningful actions, actions that have relations of meaning to one another in terms of some cultural system" (Lemke, 1997, p. 43). For example, children selling candy on the streets of Brazil developed techniques for manipulating numbers that are related to currency exchanges, whereas their age-mates in school learned standard number orthography (Saxe, 1990). To understand why the candy sellers acquired the particular mathematical knowledge that they did and why it was so different from what their age-mates learned requires reference, at least in part, to the "mathematical and economic problems linked to the practice" of candy selling (Saxe, 1990, p. 99).

Thus, learning from a situated perspective occurs through the learner's participation in the practices of a community, class, workplace, or culture (Driscoll & Burner, 2022). Moreover, learning is a dialectical process, which means that "person and context operate jointly to create outcomes" (Turner & Nolen, 2015, p. 168). Consider, for example, the instructional design profession as a community of practice. As a student, you are a newcomer to the community, engaged in learning its models and practices and becoming ever more competent as you gain experience in these practices. With increasing participation, newcomers become old-timers in the community, individuals who manage the resources and affect the practices of the community at large. Faculty members in programs, for example, change the practices of the field through their participation in research and development.

According to Wenger (1998), learning via participation can be defined:

- Individually, i.e., as members engage in the practices of a community
- Community-wide, i.e., as members refine the practices of a community and recruit new members
- Organizationally, i.e., as members sustain the interconnected communities of practice through which "an organization knows what it knows and thus becomes effective and valuable as an organization" (p. 8)

Organizations that hire instructional designers, for example, constitute their own communities of practice that embody the ways in which design is conducted in the context of their businesses. Yet their practices are influenced by the academic communities from which they recruit their instructional designers. It should also be obvious that the influence of interconnected communities of practice works in both directions; academic programs modify their practices from time to time based on what they learn from the organizations where they place their graduates.

The situative perspective has had an increasing impact on many areas of psychology and the learning sciences as evidence accumulates that knowing cannot be separated from action. That is, “knowing is knowledge-in-use, and knowledge can only be fully understood through its use, through practices in addressing a problem at hand” (Driscoll & Burner, 2022, p. 247). Consider, for example, the unique and specific ways instructional designers think about a problem, the kinds of problem-solving strategies they use, and how they communicate with one another on a team. But what they do also depends on the environment in which they work and the tools they use or invent to support their activity.

Because knowing is situated in action and the practices of a community or culture, it is also important to recognize that people belong to more than one. This means learning often involves apprehending the differences between various communities or cultures to navigate successfully in each. Gee (2015) cited the example of a young student whose concept of storytelling based on her experience at home diverged sharply from the teacher’s concept of storytelling in a class activity designed to prepare students for expository reading. The teacher failed to recognize the student’s cultural socialization, inadvertently creating a risk of alienating the student from school and school literacy.

To obviate such risks and facilitate learning, situated learning theorists proposed strategies such as apprenticeships and learning communities where students work on real problems with others who have different areas and levels of expertise than they do. They improve their ideas and understanding through negotiation and argumentation, and they contribute to knowledge building within the community.

GAGNÉ’S THEORY OF INSTRUCTION

Although many learning theorists may be interested in what their work means for instruction, the explanation of learning is their primary concern. Robert M. Gagné, on the other hand, was primarily concerned with instruction and how what is known about learning can be systematically related to the design of instruction. He proposed an integrated and comprehensive theory of instruction that is based primarily on two foundations: cognitive information processing theory and his own work tackling practical problems in military training programs.

As it evolved, Gagné’s theory of instruction came to comprise three components:

- A taxonomy of learning outcomes
- Internal and external learning conditions associated with the acquisition of each type of learning outcome
- Nine events of instruction that each facilitate a specific cognitive process during learning

Learning taxonomies existed before and since Gagné’s, but none other besides his includes all three domains in which people are presumed to learn: cognitive, affective, and psychomotor. According to Gagné (1972, 1985; Gagné & Medsker, 1996; Gagné et al., 2005), there are five major categories of learning:

- Verbal information, i.e., recalling facts
- Intellectual skills, i.e., applying knowledge

- Cognitive strategies, i.e., employing effective ways of thinking and learning
- Attitudes, i.e., feelings and beliefs that govern choices of personal action
- Motor skills, i.e., executing precise, smooth, and accurately timed movements

The reason for defining different categories of learning outcomes stems from the assumption that each requires different conditions for learning. For example, learning to ride a bicycle (a motor skill) is different in fundamental ways from learning the multiplication table (verbal information), which is different in fundamental ways from learning to solve scientific problems (intellectual skill).

The differences in conditions of learning across learning outcomes provide guidelines for which conditions must be included in instruction for specifically defined instructional goals. For example, instruction on the goal of “perform CPR” (motor skill) is likely to include a demonstration of the procedure, individual practice on the procedure, and perhaps a job aid depicting each step. On the other hand, instruction on an attitudinal goal implicit in a driver education course (such as “use a designated driver after drinking”) is likely to provide a human model and focus on the benefits of making the desired choice.

In addition to conditions of learning that are unique to each learning outcome, there are conditions of learning which facilitate the process of learning in general. Gagné conceived of the nine events of instruction as learning conditions to support cognitive processes such as attention, encoding, and retrieval. The events of instruction are presented briefly here:

1. Gaining attention – a means of orienting learners to instruction
2. Informing the learner of the objective – a statement or demonstration to establish expectations about the goals of instruction
3. Stimulating recall of prior learning – a question or activity to prepare learners for making connections between what they already know and what they are learning
4. Presenting the stimulus – an activity or information that presents the content of what is to be learned
5. Providing learning guidance – cues and strategies to promote encoding
6. Eliciting performance – an opportunity to practice
7. Providing feedback – information of a corrective nature to help learners improve their performance
8. Assessing performance – an evaluation of what has been learned
9. Enhancing retention and transfer – examples or activities that prompt learners to go beyond the immediate context of instruction

The application of Gagné’s theory in instructional design is often a highly analytical affair, and it is therefore possible to lose sight of the overall context for learning while dealing with all the details of instruction. As a means of helping instructional designers integrate multiple goals into instruction, Gagné and Merrill (1990) proposed the notion of an enterprise schema. The enterprise schema defines the context for learning, the reason for learning a particular set of goals in the first place. For example, the enterprise schema of “managing a lemonade stand” provides a meaningful context for learning how to exchange currency, how to calculate needed supplies based on an anticipated volume of business, and so on.

CONSTRUCTIVISM

Constructivism is not a single theory, but rather a collection of views sharing a fundamental assumption about learning that contrasts sharply with the assumptions underlying theories such as information processing. The contrast can be drawn this way. In information processing theory, learning is mostly a matter of going from the outside in. The learner receives information from the environment, transforms it in various ways, and acquires knowledge that is subsequently stored in memory. In constructivist approaches, on the other hand, learning is more a matter of going from the inside out. The learner actively imposes organization and meaning on the surrounding environment and constructs knowledge in the process.

From a radical constructivist point of view, knowledge constructions do not have to correspond with reality to be meaningful, but most constructivist researchers agree that not all knowledge constructions are equally viable. To sort out which ideas are viable and which are not, learners must test their personal understandings against those of others, usually peers and teachers.

Constructivism has had a substantial impact on views pertaining to the learning conditions and instructional strategies believed to support constructivist learning goals. To engage learners in knowledge construction, facilitate tests of their understanding, and prompt reflection on the knowledge-generation process itself, constructivist researchers have recommended the creation and use of complex learning environments. Such learning environments should:

- Engage learners in activities authentic to the discipline in which they are learning
- Provide for collaboration and the opportunity to engage multiple perspectives on what is being learned
- Support learners in setting their own goals and regulating their own learning
- Encourage learners to reflect on what and how they are learning

Constructivist learning environments differ greatly in the amount and kind of instructional support they provide and how much cognitive load they impose on learners. The concept of cognitive load came about originally from the limitations in working memory that information processing researchers observed when learners tackled complex and difficult tasks. Investigations of cognitive load led to strategies such as providing learners with worked examples and partially completed problems that they review or finish solving. Worked examples appear to be effective not only in well-structured domains (such as algebra) but also in complex domains that are largely heuristic in nature (such as troubleshooting in engineering; Renkl et al., 2009). The evolution of cognitive load theory also focused increasing attention in the instructional design field on learning of complex, cognitive skills.

Instructional designers who employ constructivist approaches need to incorporate the most appropriate learning and transfer of learning strategies for the particular context in which the learning and the performance will occur. The 4C/ID model for complex learning combines elements of constructivism and information processing in its call for learning tasks to be sequenced in ways that reduce cognitive load (van Merriënboer et al., 2003; van Merriënboer & Kirschner,

2007; van Merriënboer & Kirschner, 2018). That is, learners are gradually introduced to a series of task classes, each of which represents, on a simple to complex continuum, a version of the whole task. These are supplemented with just-in-time information and part-task practice, depending on the learner's growing expertise and ability to transfer the new knowledge, skills, and/or attitudes.

Consistent with constructivist learning theory, the Interactive – Constructive – Active – Passive (ICAP) theory of instruction offers evidence that deep learning occurs when learners are interacting with each other to collaborate and add new knowledge – a keenly constructivist act – or generating artifacts that elaborate their own thinking and knowledge (Chi et al., 2018). In contrast, shallow learning occurs when learners are engaged in activities involving manipulation but not creation or are passively learning. This theory is particularly instructive to instructional designers because it separates learning and instruction.

Understanding how learning works and then developing instruction to most efficaciously manifest that learning is not sufficient to garner success. Implementation is also critical. Facilitators need to be trained in delivery just as much as instructional designers need training in developing materials that manifest the theory. Self-paced instruction may require complex learning technologies in order to provide learners with IC learning environments. This need for additional facilitation training or specialized learning technologies can initially be interpreted as a hurdle to the implementation of constructivist approaches. Reframed, however, it becomes a call to action for stakeholders to recognize and resource quality facilitation around effective approaches to learning, whatever the approach or modality.

LEARNING AND (DIGITAL) TECHNOLOGY

The final theory to be considered in this chapter has its roots in the neural networks of cognitive science and artificial intelligence (e.g., Nielson, 2015). Its proponents argue that connectivism as a learning theory is very different from all the other theories discussed here. According to Downes (2014), learning is defined in connectivism as “the formation of connections in a network,” and “networks ‘learn’ by automatically adjusting the set of connections between individual neurons or nodes.” Learning results, then, not in “the accumulation of more and more facts or memories but the ongoing development of a richer and richer neural tapestry.”

Siemens (2005) articulated a set of connectivist principles that serve as a basis for application in both individual and organizational settings:

- Learning and knowledge rest in diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than what is currently known.
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and the meaning of incoming information is seen through the lens of a shifting

reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

(pp. 5–6)

These principles suggest that information is ever-changing as new contributions are made to the network. The learning process must be cyclical as a result, dependent on learners' abilities to find new information, filter out extraneous information, and share their realizations (Kop & Hill, 2008; Goldie, 2016). This best occurs in a digital environment that affords and promotes "connections, diversity, and growth in a dynamic self-regulating system" (Driscoll & Burner, 2022, p. 288).

The empirical evidence supporting connectivism is scant, and it remains underconceptualized as a theory (Bell, 2011; Clarà & Barberà, 2013). Perhaps for these reasons, connectivism is increasingly associated with online or computer-supported collaborative learning (CSCL), which has its origins in Scardamalia and Bereiter's (1994, 1996) work studying a community-of-learners approach to instruction called CSILE, or Computer-Supported Intentional Learning Environment. CSILE – and its upgraded version, Knowledge Forum (Scardamalia, 2004; Zhang et al., 2009) – is a computer tool that enables students to engage in the discourse of a subject matter discipline in a scholarly way. In contrast with constructivism, where the learning is unique to the individual, in CSCL learning environments, learners focus on a problem and build a communal database, or "knowledge space," of information about the problem in order to participate in joint meaning making.

Jeong and Hmelo-Silver (2016) suggested seven affordances for effective CSCL learning environments that instructional designers should consider:

1. Finding and building groups and communities
2. Establishing a joint task
3. Communication
4. Sharing resources
5. Engaging in productive processes
6. Engaging in co-construction
7. Monitoring and regulation

Learners need a lot of support in both constructivist and CSCL-inspired learning environments. Instructional designers should have a keen understanding of the affordances and detractors technology can bring to the learning environment. For example, in multimedia instruction, Mayer and Moreno (2003) suggested that narration, rather than on-screen text, be used with animation or diagrams so that learners' attention is not split between two sources of visual input. The split-attention effect can also be reduced in text-based instruction by integrating explanations within diagrams instead of requiring learners to mentally integrate text and pictures (Sweller et al., 1998). Much like with constructivist approaches, both the instructional designer and the facilitator need ample training to manifest the most effective learning outcomes when applying connectivist and CSCL principles.

CONCLUSION

This chapter has presented a brief introduction to some of the major psychological principles and avenues of thought that have contributed (and continue to contribute) to professional practices in the field of instructional design.

Behavioral and cognitive information processing theory came out of research programs dominating psychology in the 1960s and 1970s. Gagné's theory evolved through two decades of research from the 1960s to the 1980s and integrates cognitive with behavioral views. These theories collectively form the bedrock on which the field of instructional design was founded and initially developed. They provided, and continue to provide, useful and reliable guidance for designing effective instruction.

Constructivism, schema theory, and situated learning theory now offer the ID field other ways of thinking about learning. Along with advances in technology, they promise design strategies for producing learning environments more complex, more authentic, and more appealing than ever before. The long-term implications of these theories to the ID field are not yet fully known, but they surely offer an invitation to professionals new to the field to help shape that legacy.

Summary of Key Principles

Taking into consideration the various theories of learning and instruction that have been described in this chapter, listed next are some key principles instructional designers should keep in mind as they engage in the design process:

1. Observe the behavior of learners to identify what students need to know, where they need practice, and when they have met a desired standard of performance. This can also help you make judgments about the effectiveness of instruction in facilitating students' learning.
2. Use instructional strategies that direct learners' attention, help them make relevant information personally meaningful, and provide them with practice in a variety of contexts to facilitate transfer.
3. Provide opportunities for students to work in communities of learning, where they tackle complex problems, share information, challenge each other's perspectives, and arrive at common understandings. Provide appropriate supports and guidance.
4. Align conditions of learning with the type of learning outcome students are expected to attain. Be sure to incorporate the nine events of instruction to facilitate the overall process of learning.
5. Engage learners in authentic activities and collaborative problem solving. Use instructional strategies that enable students to set their own goals, monitor their own progress, and reflect on their own learning.
6. To help students learn complex skills, use instructional strategies such as worked examples and partially completed problems to reduce cognitive load.

Application Questions

1. Assume that you are trying to teach learners how to calculate and compare the unit costs (e.g., price per ounce) of various sizes and/or brands of the same product. Select three of the theories of learning discussed in this chapter. For each of the three, describe the nature of the instructional activities that you would design if you were adhering

to that theory as you were planning the instruction.

2. Select two (2) instructional goals, one that represents a simple learning outcome and one that represents a complex learning outcome. How would the learning

theories discussed in this chapter be employed to develop instruction to teach the goals you have selected? How would the instruction differ in each case? Would one or another theory be more applicable to one goal versus the other? Why?

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Constructivism for Active, Authentic Learning

Brent G. Wilson and Kae Novak

If you spend time with professional educators – K–12 teachers, education professors, or even corporate trainers – you will run into the term *constructivism*. As its name suggests, constructivism sees learning as a process of constructing or making something. Constructivism says that people learn by *making sense out of the world*; they make meaning out of what they encounter. Exactly how people do so is something that learning theorists debate, some arguing for fairly mechanistic processes of information encoding and retrieval, others seeing the process in qualitative, experiential terms. Whatever the exact process of meaning construction, instructors and instructional designers try to create conditions for meaningful learning in classrooms, in courses, and on the job.

This chapter examines the place of constructivism in the field of instructional design and technology (IDT). To do this, we briefly show where constructivism fits into the history and evolution of the field. We present some potential benefits and problems with the approach, then conclude with some thoughts about its continuing role in the profession.

As an educational philosophy, constructivism came to prominence in the 1990s (e.g., Jonassen, 1991). The basic precepts include:

- Learning is an *active process of meaning-making* gained in and through our experience and interactions with the world
- Learning opportunities arise as people encounter *cognitive conflict or challenge*, and through naturally occurring as well as planned *problem-solving* activities
- Learning is a *social activity* involving collaboration, negotiation, and participation in authentic practices of communities

A typical example of constructivist instruction presents a complex problem or challenge within a resource-rich environment, with learners working together and assuming responsibility for activities and decisions, and teachers in a support role. Instructional designers look for prescriptive guidelines, so constructivism became a set of principles for creating meaningful, engaging instruction. See Table 7.1 for a set of prescriptions for constructivist design.

TABLE 7.1 Constructivism Expressed as a Set of Prescriptions for Designing Instruction

Problem	• Design instruction around a problem or small set of problems that is/are: • Authentic – similar to those encountered outside of school • Complex – involving multiple interconnected factors • Wicked – with many possible framings, solution paths, and solutions • Anchor individual skills to a larger valued goal
Environment	• Design the learning environment to resemble a real-world situation, with access to tools, information, and natural resources • Provide opportunities for performance feedback in the form of natural consequences
Learner's Role	• Encourage learner ownership by highlighting the relevance of the problem and encouraging the pursuit of interests • Grant learners the main responsibility for knowledge advancement • Provide opportunities for social interaction, communication, and collaborative teams • Encourage learner reflection
Instructor's Role	• Emphasize guidance and facilitation – “guide on the side” rather than “sage on the stage” • Focus on deep engagement rather than coverage of topics • Build on prior knowledge and experience

The principles in Table 7.1 suggest a re-negotiation of teacher and learner roles. Instruction is not so much *done to* learners, rather it *engages* learners in a process of inquiry and meaningful activity. The instructor's role shifts from “sage on the stage” to “guide on the side.” And while the principles are framed in terms of a human instructor in the classroom, the instructor function can be done through careful design of learning materials, particularly through online technologies.

Constructivist teaching is often contrasted with the traditional teacher-centered approach, with students passively receiving content presented in lectures and textbooks. This has mistakenly been characterized as *behaviorist* – a mistake since behaviorist learning requires, above all, active responding. And when examined closely, both lectures and textbooks are highly evolved tools and not as passive as they appear (Friesen, 2011, 2013). But it is no mistake that learners, whether in K–12, higher education, or training settings, are too often under-engaged, under-challenged, passive, or disengaged mentally and physically. So, constructivism remains a compelling idea for learners and instructors at all levels of education and training.

INSTRUCTIONAL MODELS LINKED TO CONSTRUCTIVISM

Described next are some noteworthy instructional models developed during the early years of the constructivist movement that are still in use today:

Problem-based learning. Working with medical-school faculty, Howard Barrows (1988) developed a model for centering instruction around a key

statement of a problem, prompting team-based inquiry and problem-solving processes. The problem-based learning (PBL) model spawned hundreds of projects and research studies in a variety of disciplines and has been largely successful in terms of student learning (Hmelo-Silver, 2004).

Case- and scenario-based learning. In the 1990s John Bransford and colleagues produced a series of video lessons presenting a problem in an everyday context, requiring math for its solution. These authentic “macro-contexts” for classroom discussion and problem solving were proven useful as instructional strategies (Cognitive and Technology Group at Vanderbilt, 1990) and influential as instructional designers borrowed elements of these cases for incorporation into their own instructional and training products.

Cognitive apprenticeship. Based on a theory of situated cognition, Alan Collins and John Seely Brown developed an instructional model meant to include key aspects of informal learning (Collins et al., 1989), similar to how apprentices learn from their masters in work settings. This model became popular among instructional designers seeking a framework for designing authentic but replicable instruction.

ILLUSTRATIVE CASES

Here are two examples where high-level outcomes resulted from specific constructivist activities and were aligned with required course learning outcomes from a state level transfer reciprocity agreement.

Accounting Formulas Made More Real

Professor Chris teaches Intro to Managerial Accounting, where students learn to determine costs using various costing systems. Accounting courses often rely on lectures, with the professor applying accounting formulas in class, followed by auto-graded homework problems within a management platform. Professor Chris, a former small business development director, has taken a constructivist approach to revising this course. Because working accountants are commonly brought in physically to businesses to do cost accounting activities – most often for opening a restaurant – Chris uses this as the basis for an assignment he titled “Chris’ Cucina Consulting.” Students individually go into a restaurant of their choice to observe, count, and analyze the front-end costs of running the restaurant. Students count tables, seats, employees, tablecloths, utensils at self-service areas, and anything else that would incur a cost to the business owner, taking pictures or videos on their smartphones as they observe and gather data. Students then share and discuss initial findings with a peer working group. After feedback and revisions, students formally present their findings to the class (with peer critique) along with a written report detailing cost analysis and recommendations.

Día de Los Muertos Altars – For Anthropology/Chicano Studies

In Professor Angelica’s cross-listed course, one of the main learning outcomes is for students to develop connections between diverse cultural perspectives

and experiences, including their own. Professor Angelica has decided, rather than having her students reading texts or watching videos, the students will build their own artifact. As a constructivist activity, Angelica has each student create a Día de los Muertos altar in their classroom to understand the meaning of the holiday to families within the Chicanx culture. Even though more than half of her students are not familiar with the celebration of Día de los Muertos, each student creates an altar based on their own families. The altar includes family photos as well as favorite foods, sweets, decorations, and objects representing the deceased. Through this physical creation, students have a point of reference to examine Chicanx culture; compare death, memorialization, and family with other Latin American cultures; and explore religious memorialization around the world. The activity of creating altars and comparing altars with their peers is the targeted learning. Student essays written prior to and after the activity are also assessed for focal vocabulary, symbolic relationships, and comparison of kinship and social organizations across cultures, including their own.

POTENTIAL BENEFITS

Proponents of constructivism point to a number of strengths of the position, summarized here:

Correspondence to how people really learn. Constructivism's depiction of learning through active engagement and meaningful activity is generally corroborated by research (e.g., Dennick, 2016). A research community known as the Learning Sciences has continued a serious research agenda based on constructivist-compatible ideas (Sawyer, 2006).

Higher-order learning outcomes. Constructivist teaching focuses on problem solving and critical thinking, and higher-order cognitive outcomes. These higher forms of learning, while challenging to accomplish, are critical objectives for education and training, and closer to the demands of expertise in the "real world." Focus on higher-order learning helps IDT professionals move beyond narrow technical training to include "softer" training for leaders and professionals.

Better integration of affect and emotion. Constructivist learning seeks to integrate emotion, affect, and engagement into discussions of learning and cognition. This holistic approach is generally good because instruction becomes more than an "academic" thing – it draws on the whole person and leads to more realistic representations of expertise.

More relevance to job and out-of-the-classroom performance. Because of its emphasis on authentic performance in realistic settings, constructivist learning can be more relevant to out-of-the-classroom needs. As learners encounter more complex problems and tasks during instruction, they should be able to transfer that knowledge to work settings more easily. For certain kinds of job needs, a very focused tutorial or job aid available at work may be more appropriate than a constructivist learning experience. Generally, though, constructivist principles should lead to greater relevance to jobs and the outside world.

RELATED MODELS

The projects and models described here illustrate constructivism's continuing influence today:

Flipped learning. In 2007 two small-town science teachers in the mountains of Colorado, Jon Bergmann and Aaron Sams, made their recorded lectures available for student viewing at home and then used classroom time for student consultation and problem solving. They called it *flipped learning* or the *flipped classroom* – and interest took off (Noonoo, 2012). Their website (the Flipped Learning Network at www.flippedlearning.org) includes a variety of research reports showing growth in adoption and positive effects of flipped-learning activities (Fitzgerald & Li, 2015; McLaughlin et al., 2014; Hussain et al., 2020). Flipped classrooms tend to become constructivist spaces because learners are focused on problems with support from each other and a consulting teacher. The popularity of *flipped learning* increased and was utilized internationally in remote classrooms throughout the COVID-19 pandemic (Chisini et al., 2022; Nursyahdiyah et al., 2022). Note that the model still makes use of lectures, but students gain a measure of control over them, treating a recorded lecture as a *learning resource* that they can access and use – rather than an *imposed experience* that they must sit through regardless of their learning state.

Connectivism. In 2005, Canadians George Siemens and Stephen Downes developed an approach to learning called *connectivism*, stressing the active creation of meaning by engaging networks of human and information resources and based on ideas derived from the open Web and online learning. Siemens (2005) offers a set of descriptive principles:

- Learning and knowledge rests in a diversity of opinions.
- Learning is a process of connecting specialized nodes or information sources.
- Learning may reside in non-human appliances.
- Capacity to know more is more critical than knowing what is currently known
- Nurturing and maintaining connections is needed to facilitate continual learning.
- Ability to see connections between fields, ideas, and concepts is a core skill.
- Currency (accurate, up-to-date knowledge) is the intent of all connectivist learning activities.
- Decision-making is itself a learning process. Choosing what to learn and identifying the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision.

Connectivism was influential in the design of the first open MOOCs (massive open online courses) and open education resources (OER). We see connectivism as largely compatible with constructivist precepts, with a pro-information, pro-online bias that may work wonderfully for some learners. With the

popularity of AI large language models processing tools, such as text-based ChatGPT and AI generative art programs like Midjourney (www.midjourney.com) and Stable Diffusion (stablediffusionweb.com), connectivism's principle of learning residing in non-human appliances may open innovative approaches to constructivist learning experiences in the future (Siemens, 2005).

Maker movement. The maker movement is the technology side of the DIY (do-it-yourself) culture consisting of hobbyists and craftsmen who build things, whether for learning, or interest, or profit. Examples of maker products include 3D printing, robotics, HAM radio, and DIY electronics. Many of these activities have clear potential for learning and are seen in pre-engineering curricula as technical creativity. Since 2013 MIT has been accepting maker portfolios as a supplement to their undergraduate application (MIT Admissions, n.d.). Concepts associated with the maker movement include tinkering, visual thinking, and the learn-to-code movement in schools. The makerspaces can include culturally relevant learning experiences that appreciate and celebrate local communities' funds of knowledge (Vossoughi et al., 2016). These are all related to the learning theory of *constructionism* (not constructivism), focusing on learning through making things (Harel & Papert, 1991).

This sampling of projects and movements shows the enduring impact of constructivism in current thinking and practice. The proliferation of "isms" can be daunting – constructivism, constructionism, connectivism – but in a way, the success of constructivism has led to an expansion of forms and labels over time.

POTENTIAL CONCERNS

Like all approaches, constructivism solves some problems while creating others. There are some situations where a constructivist solution is a perfect fit, and then others where it may be a stretch. In this section we examine some of the downsides to adopting a constructivist stance.

In most courses, instructors are the hardest workers. They are the most active and engaged; they rarely fall asleep in class. They make the hardest and most interesting decisions and solve the most problems. And they tend to learn the most (their first few times teaching anyway). This is reversed in constructivist instruction: Learners are put in situations where *they* have to do the really interesting work. They take on jobs that the instructor might otherwise do – choosing an area to work on or an approach to solving a problem, determining roles of team members, judging sources and methods, evaluating quality and appropriateness of solutions, giving feedback, and consulting with other learners. While in theory handing over these responsibilities to learners may sound great, a number of questions quickly emerge:

- Are learners prepared to take on this new work?
- Are they motivated and emotionally mature enough to work independently and look after each other's interests?
- Do they have the prior knowledge they need to handle complex, authentic environments?
- Do they have adequate access to needed information?

In general, learners are most helped by *scaffolding* when first performing challenging complex tasks. The scaffolding metaphor draws on Vygotsky's idea of a zone of proximal development, where children can perform complex tasks but only with assistance from a guiding adult (Wood et al., 1976). In our field the concept refers to a variety of supports, helps, information resources, and advisement tools aimed to help learners through initial performance of a complex task. The best scaffolding is uniquely tailored to the learner and their learning goals (Sawyer, 2006). Scaffolding supports are intended to be temporary, until learners are able to do the work more independently.

In this light, high-quality constructivist teaching requires more support, more access to resources, more attention to detail, more progress monitoring, and more carefully crafted guidance than traditional instructor-led teaching. Setting up a constructivist learning experience and getting it working right can be a costly investment for instructional designers, nearly always requiring field testing to get right. But if done well, the investment can result in significant learning gains – and just as important – more fully engaged learners. After iterations of design and revision, the instructor may end up truly acting as “guide on the side,” enjoying the energy, engagement, and active learning of individuals and teams.

As learning becomes more student-centered, questions also arise concerning the role of the instructor. Maintaining control and surviving a transition to student-centered learning are probably the top concerns for many instructors. Teaching a class is like finely tuned choreography, and instructional designers who try to upset the dance by changing steps and inserting new routines can easily lose their audience in the process. The shift toward constructivist learning is indeed a major decision and commitment, involving new learning for students and instructors alike. Instructors who are being asked to make this shift should be supported in their efforts and have access to knowledgeable mentors, information resources, and a supportive incentive/management structure to make this change successfully.

A CAUTIONARY CASE

To illustrate how constructivism can go awry in practice, consider the case of Professor Rosario. Rosario thinks of themselves as a constructivist.

Their courses contain just a few articles as assigned readings but lots of elective readings. Students complete just two major projects, one individually completed and one assigned to groups of three or four students. Professor Rosario rarely lectures, but rather turns class time to students to work on their projects. Each project has a rubric with criteria to guide students, also used for grading. Students approach the professor about their work, and Rosario in turn advises and helps students find resources.

Unfortunately, Rosario's students report a frustrating experience. They come into the class lacking knowledge, and too often exit with the same concern. A feeling of disorientation pervades. They are tired of not knowing where to look, pursuing unpromising leads, waiting for help or guidance. Only gradually do they create a picture of things – but too late to really be of help on assignments.

The moral of the story: It's possible to follow the precepts of constructivist learning and still have less than successful instruction.

APPLY CONSTRUCTIVISM – FLEXIBILITY IS THE KEY

Instructional theories are rarely applied in a strict fashion during the instructional design process. Instructional models are best thought of as helpful heuristics, not precise algorithms; adjustments are made for context, student population, and available resources. Given what we know about human learning, constructivist teaching methods and activity design should be given serious consideration. But keep in mind: Every instructional theory is seriously *under-specified* – that is, it doesn't really tell you everything you need to design a lesson based on that theory. Too much depends on the local situation, the goals and constraints, and expertise of participants. Instructional theories are necessarily abstract and general, leaving so much to real-life teams and individuals. Constructivism in its many faces and forms contributes to that theory base. At the same time, the field depends on skilled professionals who know what to *do with* a good theory – to use it in combination with local knowledge and ideas for making good instruction.

DEVIL IN THE DETAILS

Several issues or conditions may constrain the use and success of constructivist instruction. These points remind us that the “devil is in the details” when it comes to doing instructional design.

- *Low-level outcomes due to inefficient activity.* Professor Rosario's students may be working actively on “authentic” tasks within complex environments, but their efforts are not directed at the right work. Too much time is spent on low-payoff activities: vague information searching, attending to unimportant tasks and details; trying to solve problems using means-end strategies (essentially educated guessing and trying again). In spite of all their activity, a close look at learning gains is disappointing: not much new information has been acquired, and not enough higher-level problem solving and schema acquisition has occurred.
- *Misalignment with standards and objectives.* Constructivist learning approaches tend to focus on just a few projects and cases. For a strictly defined curriculum, this could lead to a disproportionate investment of time and attention, leaving other objectives unaddressed. Making things fit within an existing curriculum can require some larger rethinking of overall goals and objectives.
- *Mistaking activity for targeted learning.* Many of us confuse busy activity with learning. While activity does equate to learning at some general level, activity does not assure mastery of a *targeted* learning objective. Thorough assessment of *targeted* learning can verify whether students' active engagement is actually resulting in their picking up the needed knowledge and skills of the lesson. In addition, multiple assessments – ongoing and summative, formal and informal – can provide a redundancy to assure mastery of any critical learning objectives.

- *Hard to measure benefits.* The full learning accrued from constructivist teaching methods can be hard to pin down using objective assessments. The easiest way to teach a fixed and narrow learning target might be straight-ahead direct instruction. But constructivist methods lead to *broader* outcomes – a competent, confident problem-solver who loves the subject matter. This is not, however, a reason to quit on constructivism – rather, instructional designers should strive to identify and/or create assessment techniques that adequately address both the bottom-line skills *and* these harder-to-measure outcomes. This should be an opportunity for better assessment – not giving up on a constructivist strategy.
- *Privilege and access.* Critiques of privilege and power tend to examine the winners and losers of any ideology or intervention – and constructivism needs to undergo the same scrutiny. Critical theorists have offered critiques of constructivism that cast it as another privilege enjoyed by the White middle class (Popkewitz, 1998). One study in career technical education found that lower-paid workers often receive technical training that is less engaging and authentic when compared to university training (Ng et al., 2022). Access to enabling technologies also varies across class, race, and culture (King & Boyatt, 2015; Perrin, 2017). When learners are not well-prepared with prior knowledge and academic study skills, constructivist projects may be seen as a dispensable luxury. Even when constructivist lessons are employed, are steps taken to ensure that all students really benefit? Too often students of lower socioeconomic status find themselves in inauthentic situations and less than meaningful activities (Sheehy, 2002). This is why we emphasize that constructivist learning activities require extra care and investment – to be sure that everyone can benefit from the experience.

WHEN CONSTRUCTIVIST STRATEGIES MAY NOT BE A GOOD IDEA

Remember – in general we recommend serious consideration of constructivist strategies as a method for instruction, because it generally fits how people learn. No single approach is complete and perfect, however. Here are some times when a constructivist strategy may *not* be a good idea:

- The content consists of technical material with fixed, known rules and procedures or models that must be mastered or remembered with precision.
- Curriculum is driven by high-stakes exams that are mandated and external to the instruction.
- The situation requires short time frames with limited time and resources to devote to teaching and the preparation of materials.
- Learners may expect and want to be provided the material and the answers, led by an instructor and driven by the content or an exam.
- The school or business does not support a learner-centered culture – lacking support for instructors or facilities or technology – or a tradition of learner-centered teaching.

Our purpose is not to discourage use of constructivist strategies – but rather to help you succeed in designing effective instruction as you apply constructivist principles.

CONCLUSION

Constructivism has nearly achieved the status of common sense among educators, even while it has evolved into a number of instructional models and approaches. The term “constructivist” remains a good shorthand, suggesting instruction that is more meaningful, authentic, and problem-based. These are enduring values among instructional designers and will have a place in our discourse for many years to come.

Summary of Key Principles

1. **Constructivism is both a philosophy or stance toward learning and an approach to designing instruction.** The philosophy emphasizes learners’ construction of meaning through collaboration and engagement with the world. Constructivist instruction is typically built around authentic problems and projects, with problem solving and higher-order thinking skills, rather than narrow technical skills, being the target of learning.
2. **Constructivist teaching involves new roles for student and instructor.** Students take on much of the work traditionally assigned to the instructor, e.g., selecting topics, choosing instructional resources, etc. – while the instructor serves as “guide on the side” rather than “sage on the stage.” This shift requires preparation and support for both student and instructor.
3. **A principal concern is preparing learners to take more responsibility for their own learning.** Students often lack the prior knowledge or dispositions to succeed with these added responsibilities – that’s why they come as learners. Constructivist teaching asks a lot of learners, both cognitively and emotionally. Scaffolding strategies (temporary supports meant to recede over time) give learners that extra boost as they initially perform complex tasks, leading to richer, deeper learning outcomes.
4. **Constructivism typically takes more work, not less.** Compared to traditional approaches, constructivist designs generally require more careful design, performance monitoring, scaffolding, and field testing in order to provide the needed guidance and support to learners.
5. **Constructivism has had a major impact on the practices of many instructional designers.** Constructivist values are reflected in a number of projects and models, and continue to influence professional standards in the field.
6. The key to successful constructivist instruction – indeed of all instructional design – lies in the **details of the doing**, at least as much as in the particular theory or model being applied.

Application Questions

1. **Nurses Training:** The training director at the county hospital has asked you to design a three-hour (maximum) training session which will be delivered over Zoom for the nurses on how to have difficult conversations with family members of patients. The nurses at the local hospital have identified these conversations as “wicked problems,” because every conversation varies greatly and each attempt has a significant impact on the patient’s family. The training director has also shared that increasing numbers of Burmese (Myanmar) and Ukrainian immigrants are accessing the hospital’s services.

Ten nurses will attend each training session, which will be offered repeatedly over Zoom until all the nurses in the hospital have had the opportunity to attend. The training director suggests: “Can you design the session using a constructivist approach? I’d like nurses to somehow get engaged in something meaningful, not just see a lecture or be taught a set of bullet points. I wonder if role-play in their environment could help with the authenticity of the training.”

As a start, he has asked for a one-page (approximately 400 words) memo and a short storyboard of any activities that will describe/communicate:

- The instructional activities that will take place during the Zoom training session
- How those activities embody most of the instructional principles associated with constructivism (*be sure to clearly indicate what those principles are and how the activities embody those principles*)

Write the memo and include the storyboard!

2. **Online Open Pedagogy – Biology Course:** As an instructional designer within the Faculty Teaching Center, you are working with Maya, a tenured professor doing a makeover of an introductory biology class offered to non-majors. Now entering her fourth year teaching the course online, she feels experienced and qualified to teach online. In an effort to make the course more engaging, she revised a biomimicry unit into an open pedagogy project for teams of three to four students working together in private work areas. Students curate content and co-create resources that will be used for future courses (Baran & AlZoubi, 2020) The response from students is encouraging – they generally like the project as a diversion from weekly readings and online discussion. The problem is: teams vary considerably in the quality of the submitted work, leading to some less-than-desirable grades for about a third of the class. Because of the course schedule, students move immediately to the next unit upon submission of work and do not review each other’s submissions.

“I like the direction we’re heading,” affirms Maya. “A couple of teams reported frustration about the unit, though; they seemed to be grasping for help about how to do it better. How can I give them better guidance without being too heavy handed? I don’t want them to just copy a template or example I provide.”

What are the next steps in the consultation process? Drawing on constructivist principles, what questions would you put to Maya – or what advice would you give her? What could

you draw from your reading of benefits and concerns about constructivist

teaching – in a way that might inform the conversation?

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The Learning Sciences

Where They Came From and What It Means for Instructional Designers

Christopher Hoadley and James P. Van Haneghan

The goal of this chapter is to describe the learning sciences perspective. We address questions about how this perspective emerged, what makes it unique, how it goes beyond previous perspectives on learning, and what research findings and practical tools for the instructional designer result from taking this perspective. To start the chapter, we will take a journey back about 40 years ago.

At that time cognitive psychology was moving into the mainstream of psychology and becoming increasingly entwined with educational applications. Overall, there were three major trends that led to the blossoming of a cognitive psychology relevant to education. First, the departure from purely behaviorist models of psychology allowed for alternative theoretical bases for understanding human learning. Second, the emergence of the interdisciplinary field of cognitive science legitimized mixing and matching approaches from disciplines as varied as computer science, anthropology, linguistics, and philosophy with traditional psychological theories and research methods, which helped bring to the forefront context and culture as key factors in learning (apart from learners' individual psychology or the particulars of an instructional design). Third, the rise of computer technology opened the doors to a design-mindedness that matched well with teaching and educational psychology, arguably the first design-oriented domains within psychology.

MULTIPLE THEORIES OF LEARNING IN PSYCHOLOGY

By the 1970s, psychology was in a marked transition. The dominant paradigm in the early twentieth century was behaviorism that focused on linking discrete stimuli to responses through association or reinforcement. However, behaviorism was challenged by a number of alternative paradigms that emerged after World War II. Work in linguistics, information theory, and the

emergence of the computer led to ideas that led to the questioning of behaviorism. For example, Chomsky (1959) suggested that behaviorist concepts could not explain the generativity of language. The growing movement toward taking 'thoughts' and 'ideas' seriously as psychological phenomenon was termed 'cognitivism.' As behaviorism was being challenged by cognitive models of thinking, cognitive scientists were building (AI) models of human cognition, and ideas about cognitive development were being developed and studied. For example, Schank and Abelson's (1977) book that melded together AI and human thinking about events led to a great deal of research using the script concept to describe how people understood and behaved in real-world contexts (e.g., how one conceptualized a visit to a restaurant). Developmental psychologists were busy testing out Piaget's theory of cognitive development to test its explanatory limits. The Laboratory of Comparative Human Cognition (LCHC) led by Cole (e.g., Cole & Means, 1981) was busy examining how many of the tasks researchers took for granted as indicative of cognitive skill were viewed differently in other cultures. Meanwhile, cognitive psychologists were investigating the implications of the cognitive architecture of human thinking by studying memory, perception, language acquisition, and how people acquire and automatize skills (Gardner, 1985). At every turn, these psychological concepts were suggesting new ways to think about education and learning.

Computer science had a unique role in this mix of disciplines, both as a tool for empirical science and as a platform for intervention. Researchers saw the promise of cognitive science (both psychology and AI work) to perhaps change the practices and approaches we had held on to for so long in education. John Anderson and colleagues began studying 'intelligent tutoring systems' (Anderson et al., 1985) in which carefully constructed AI models of problem solving in a domain such as algebra could direct a computer to provide guidance to learners. These tutoring systems were used to test and refine the induced models of how people think, but they also could be used to try to prompt and support students by solving problems along with them and then giving feedback when the students' problem solving started to stray. Papert's (1980) book *Mindstorms* showed how children could invent and create using the LOGO computer language. The premise put forth by Papert was that learning could take place in interaction with tools for construction, and computers could be general purpose tools for letting learners construct artifacts that reflected their understanding of a wide variety of domains. Bransford created the Learning Technology Center at Vanderbilt University in 1984 to develop new ways of using technology (especially video and computers) to help children learn; their interventions drew on what was known about how experts and novices think differently in learning domains, but also drew on ideas about more contextual aspects of learning, such as the use of authentic problems to motivate students. The recognition that technological artifacts and tools could change the way we think and learn was something that went hand in hand with the cognitive revolution; rather than simply deliver fine-tuned messages to students about what they should know, the cognitivists began exploring how learners constructed knowledge as they did the work of making sense of the world around them. Along with new theories of learning, new ways of researching needed to be developed because the process no longer was to simply test a theory, but to see how practices changed when new artifacts and ideas were introduced.

BROADENING THE STUDY OF LEARNING TO INCLUDE CONTEXT

Research from several different fronts seemed to point to the central role of context in understanding learning and development. As early as the 1970s, Lee Cronbach (1975) highlighted the weaknesses in psychology's reduction of the study of education to two-way linear interactions between individual differences and educational interventions. What this perspective is blind to is both higher-order (nonlinear) interactions and the effects of learning contexts. Cole's LCHC group found that depending upon the context, what was intelligent behavior could be construed differently. Those studying Piaget's theory found that children's competence on tasks of logical thinking was alterable by changing the context of the task (e.g., McGarrigle & Donaldson, 1974). Those trying to implement tools like LOGO found that success required more than giving children the opportunity to interact with the computer program, and that the effects of a tool like LOGO did not generalize as widely as people thought they might (Pea et al., 1985). Other attempts to implement what cognitive scientists thought would be effective in the classroom also ran into problems. Researchers studying memory wondered why students did not access the knowledge they had and set out to discover what it would take to help them access their available knowledge.

The recognition of the importance of context suggested that the unit of analysis for understanding learning had to be larger than the individual person. People learned things with other people and generally learned with culturally developed tools and artifacts. Hence, studying these interactions, tools and artifacts meant considering ideas from fields like sociology and anthropology, semiotics and linguistics as part of the research and theory-building process.

Four somewhat related theoretical ideas emerged to help frame this new understanding. First, there was the rediscovery of Vygotsky's theoretical work as presented in the *Mind in Society* compilation (Vygotsky & Cole, 1978). Vygotsky died in 1934, but his ideas were not widely known outside of the Soviet Union (and were suppressed there). Hence, the ideas were largely unknown in the United States. They contained within them, however, ideas that resonated with the findings of individuals applying cognitive science in the everyday world. First, instead of being secondary, the importance of culture and the artifacts were primary. Both the learning of the individual and the adaptation of the species were tied to cultural artifacts and tools. People's cognitive processes are created in conjunction with the tools of the culture, and at the same time, the tools of the culture are enhanced by the thinking of people and societies. Additionally, Vygotsky's idea of the zone of proximal development (ZPD) led people to think differently about learning, assessment, and development. The idea of the ZPD is that the cutting edge of learning is not what student can do individually, but what he or she can accomplish with the help of a more able other.

Out of these ideas, and in particular the idea of the ZPD, Brown and Campione (1994) developed the Fostering Community of Learners model for teaching science. The approach involved developing group projects around thematic science units that featured (a) distributed expertise among students and (b) activities that create a discourse around topics that look more like what scientists do than typical classroom science that focuses on vocabulary memorization and 'canned' labs.

Also coming out of the renaissance of thinking about Vygotsky was the notion of distributed intelligence (Pea, 1993). As Pea notes, the concept of historically changing tools for thinking that arise from human cultures in Vygotsky's theory fit well with the notion that technologies provided tools that changed thinking processes in people. Pea and others suggested that the transformative potential of new forms of technology that were emerging not only made activities easier, but actually changed how they were carried out. In other words, what was intelligence was actually changed by changing the tools for thinking. Thus, Vygotsky's model also provided a way to conceptualize the transformative impacts of new technology.

Second was the idea of situated learning (Greeno & The Middle School Mathematics Through Applications Project Group, 1998; Kirshner & Whitson, 1997; Lave, 1988; Lave & Wenger, 1991). For example, Lave (1988), who did work cross-culturally and in everyday contexts like grocery shopping, found that learning in these informal environments was not something that was widely generalized, but tended to be highly tied to the activity context and its meaning for the people involved. Such analysis raised serious questions for traditional schooling, where the learning of students in formal classroom settings would purportedly transfer to new contexts in the everyday world. In contrast, a basic tenet of situated cognition is that in order to promote skill transfer from the learning setting to the 'real-world' setting in which the skills are expected to be employed, the conditions in the learning setting should be as similar as possible to those that the learner will encounter in the real world. These ideas dovetailed with work coming from cultural psychology and cultural-historical activity theory, which questioned the degree to which learning could itself be separated from the contexts both in which learning takes place and in which they are applied (Cole, 1996; Cole & Wertsch, 1996; Engeström, 2002; Resnick et al., 1991).

A third idea was that of anchored instruction (The Cognition and Technology Group at Vanderbilt, 1990). The anchored instruction model arose out of the notion that in order for people to access knowledge, they need not only to experience it, but to experience it such that they can know when to use it. It is 'conditionalized' (National Research Council Committee on Learning Research and Educational Practice, Bransford, Pellegrino, & Donovan, 1999) to particular classes of events. Without anchoring the knowledge to situations where the purpose of the knowledge is clear, then it is likely to become inert. Ideas like these, and interest in applying knowledge in real contexts, led researchers to look for new perspectives. Out of work on anchored instruction came the *Adventures of Jasper Woodbury* (Cognition and Technology Group at Vanderbilt, 1992), a series of videodiscs (later CD-ROM) that was involved in helping middle school students develop skills in solving complex mathematics problems by presenting the problems to them in simulated real-world contexts designed to be of interest to the students.

Fourth, Roger Shank, bolstered by the insights gained from his computer models of how people think in the real world (e.g., Riesbeck & Schank, 1989), started a center for learning sciences that focused on developing similarly innovative approaches to professional development and training. Shank is generally seen as the first to use the term 'learning sciences,' but his concept of the learning sciences did not encompass the diversity of perspectives that today make up the field (Hoadley, 2007). In 1991, the *Journal for the Learning*

Sciences was started (Kolodner, 1991), and later the International Society for the Learning Sciences was formed.

As initiatives like these emerged, they contained some common elements that made traditional research methods problematic; yet researchers felt they were learning something fundamental about how students can learn. Traditional research and evaluation methods, such as randomized experiments, require controlling variables and manipulating only a few things at a time. Traditional program evaluation methods focused largely on outcomes without paying enough attention to the learning of researchers during the process of designing these interventions. Researchers felt they were learning something fundamental about learning as they developed new instructional approaches, and consequently felt the need to develop new methodological approaches. Brown (1992) and Collins (Collins, 1992) created what was initially talked about as design experiments and later more generally described as design-based research (Design-Based Research Collective, 2003). The basic method involved documenting what was going on in an applied setting and examining the impact of complex instructional implementations as they went through different phases of design and development.

An example of design-based research is a project in which the second author has been involved. The project involves the development of engineering design challenges for middle school students. In that initiative, both the process of developing the modules and the examination of their effectiveness are being studied. Initial analyses involve examining videotaped observations frame by frame, seeing the effectiveness of the design model in action. Later on, as the revision of the modules takes place, the results of adding new kinds of instructional tools or assessments to the modules will be examined along with more formal instructional outcomes. The focus will be on the innovative instructional processes and tools that are part of the creation of new instruction in school or other contexts. The process goes through periods of design and testing, with the processes and products of instruction being the focus. Just as an engineer may come up with a design for a product that can be used in a variety of applications and tells us something fundamental about the nature of something, so too can instructional designers engage in a process that yields a process or product that can be applied to a variety of contexts and can tell us something fundamental about learning.

Although the notion of the learning sciences emerged before its publication, Stokes's (1997) book *Pasteur's Quadrant* framed nicely what learning scientists were attempting to do. Dismissing the unidimensional 'applied vs. pure' distinction in science, he proposed two dimensions: application-relevance and theory-mindedness. The traditional view of the continuum of applied to basic research limited theoretical advances to tightly controlled experimental research. What Stokes pointed out was that the applied versus basic continuum only dealt with one dimension, practical use. It did not address the other dimension of theoretical relevance. Pasteur used practical problems that were studied without some of the tight controls of the laboratory, yet his research had important implications for basic theories in microbiology. Learning scientists too endeavor to do applied research that helps students and provides basic knowledge to the field of learning and instructional design. Stokes's book reminded researchers that applied research could yield generalizable findings that go beyond the specific context to a whole class of situations.

THE EMERGENCE OF THE LEARNING SCIENCES AS A DESIGN SCIENCE

Apart from its reliance on the multiple disciplines of cognitive science, and its willingness to consider context, the learning sciences are also noteworthy for their commitment to making education happen in authentic contexts. This commitment has several implications. First, the implementation requirement moves the learning sciences toward interventionist (and away from purely explanatory or predictive) goals. Second, because of the messiness of doing research in context, learning scientists are forced to consider methods that do not rely on tight experimental control. Hence, learning scientists have worked on developing design-based research methods.

To explore the role of design in the learning sciences, it helps to go back to the history of education as a discipline. While learning is pervasive throughout the history of the human race, formal teaching, especially as practiced in the classroom, is a more recent invention. Our current practice of universal, formal primary education, oriented toward basic literacies (linguistic and mathematical) is only a few centuries old. Lagemann (2000) describes how the twentieth century saw the consolidation of teaching as an academic discipline, and how newly founded colleges of education had to fight for academic legitimacy. Since the enlightenment, the academy has placed increasing importance on scientific forms of inquiry and knowledge (as contrasted with humanistic or craft-based forms). In the twentieth century, two schools of thought helped constitute these new colleges of education. One, led by John Dewey, emphasized pragmatic inquiry, philosophically informed but intimately tied to practice. Among his other achievements, Dewey (1896, 1929) both advanced the field of philosophy through his notions of pragmatism and founded the first 'lab school' in which teaching and learning concepts could be informed by practice. On the other hand, the psychologist E.L. Thorndike (1910) propounded a view of the field as a byproduct of psychological research in the behaviorist paradigm, with an emphasis on controlled experimentation, psychometrics, and animal studies. (To be fair, the differences between these two scholars were in emphasis; both recognized the importance of experimentation, and both recognized the importance of listening to practitioners, but their relative emphases concerning these activities were starkly different.) These two perspectives – education as a practice-informed profession, and education as a domain of psychology – competed throughout the twentieth century, but it is fair to say the psychological perspective dominated for much of the twentieth century. In many ways, the politics of the definition of the field centered on three key issues: the relationship between research and practice; the epistemology and fundamental assumptions of psychology as opposed to other social sciences; and the tension between modern, positivistic science as embodied in Thorndike's views and the postmodern perspective that somewhat parallel Dewey's perspective.

So given the diverse roots, what makes the learning sciences perspective different from the points of view that came before it? One element of the learning sciences is openness to multiple perspectives on learning. That openness is necessary because it takes multiple perspectives to understand the complex ecologies in which learning is situated. Just as traditional instructional designers work with stakeholders, learning scientists need practitioners and

individuals who see the world from the perspective of sociology and anthropology as well as psychology. Thus, most often learning scientists operate as teams rather than individuals. Note, that even though learning scientists try to look to more than psychology when it comes to learning and instruction, they would welcome a psychological perspective as one window on learning.

A second element that is important is a commitment to building solutions to the problems in teaching and learning in school *and* out of school. Learning scientists want to have an impact on learning and that means taking on the real world and its complexities. This often means studying the meaning of these complex contexts for learners at different stages of socialization into these contexts to understand how expertise is developed in the real world.

Yet a third element is that knowledge of learning and instruction that is generalizable and meaningful can be acquired by studying the design process and is not just the province of experimental basic research done in laboratory settings. What this means for instructional designers is that they too can potentially contribute to the knowledge base by documenting and reflecting on the design process and using it as a means to collect information that can drive theory. Obviously not every project an instructional designer engages in will provide such insights, but documenting and reflecting on design projects in meaningful ways can lead to the development of new insights into how people learn.

A fourth element of the learning sciences perspective is to recognize the value of informal and non-traditional instructional contexts. As Bell et al. (2009) note, if one looks at schooling in the context of the learning someone does over a lifetime, it is clear that much more of someone's life span is spent outside of school contexts in work and other situations. There is obviously value in studying learning in those contexts.

Finally, a fifth element is that learning scientists look to how new tools and artifacts created from the available technologies we have can be used to help facilitate learning. Just as an engineer might use a new type of material to create buildings that are better able to withstand hurricanes, learning scientists are interested in how the technologies that we have available can transform how we teach and learn. That means not only fitting technologies and tools into already existing structures, but also radically transforming those structures or even creating new ones (Collins & Halverson, 2009).

As noted earlier, cognitive scientists in the 1980s and '90s engaged in work on intelligent tutoring and models of human cognition focusing on the use of computing to model human cognition. For example, connectionist models focused on developing connectionist computer networks where the learning of patterns of associations was demonstrated. As Doroudi (2022) points out, the learning sciences and work on AI share common roots in these earlier attempts to understand human cognition through computer modeling. These models were precursors to models of AI that have developed into modern ideas of machine learning. However, Doroudi (2022) also notes that the fields of AI and the learning sciences have lost that common goal. With learning sciences focusing on the situatedness of human learning in context, AI models for the most part focus on improving machine learning without a necessary focus on creating insights into human cognition. From Doroudi's perspective, the interaction between the learning sciences and AI has primarily been in how AI can be applied to improve the use of educational technologies, for example,

using AI to build systems of learning analytics or to improve feedback in tutoring systems.

AI models help in the construction of courses and training that can have the potential to provide somewhat automated and tailored instruction and feedback on a scale that had not been previously possible. For example, in Massive Open Online Courses (MOOCs) where there may be thousands of students, systems that track engagement (learning analytics), automate assessment, and tailor instruction in response to assessment results, there is a great benefit in applying AI and big data technologies to improve participation and learning outcomes. Work in AI has led to a somewhat more nuanced and complex set of teams for instructional designers to work with in the development of instruction.

As the learning sciences have emerged there has been a recognition of the need to not only create new knowledge but develop further the processes of implementing newly designed learning technologies (like machine learning models) into meaningful learning environments. This was made clear when COVID forced educators to build additional online learning infrastructure. Instructional designers traditionally do their work on design and development in conjunction with subject matter experts. Given the complexities of new technologies, there was the need to develop an approach that includes more than subject matter experts. Akin to engineering, where there are multidisciplinary teams that work on projects, learning engineering teams that have expertise in multiple areas are needed. The multidisciplinary elements of the learning sciences perspective have led to a recent emergence of the “learning engineering” perspective that focuses on putting together collaborative teams with not only designers and content experts, but experts in related disciplines to learning sciences (Kolodner, 1991). This would include data scientists, computer scientists, psychometricians, as well as cognitive scientists. The notion is that there is a need to use the evidence from the learning sciences much like engineers use evidence from the sciences to engineer learning environments that are tailored to specific contexts. Wagner in Chapter 17 of this volume explores the learning engineering perspective further.

FINDINGS AND DESIGN IMPLICATIONS OF THE LEARNING SCIENCES

In the prior sections, we have seen how the learning sciences capitalized on the multiple theories of learning arriving in psychology, drew on disciplines outside of psychology that better addressed issues of learning contexts, and maintained a ‘hands on’ stance toward designing interventions for both formal and informal learning contexts. In this section, we summarize some of the findings from this work over the last 30 years as they apply to the work of instructional designers.

We can divide the major findings and implications into three areas: research on thinking, research on learning processes, and research on learning environments.

Research on Thinking and Knowing

Research on thinking has helped fulfill the promise of cognitive psychology: uncovering the architecture of the mind and its workings. An excellent summary that holds up well despite its age is Newell and Simon’s *Unified Theories of*

Cognition (Newell, 1990). One of the strongest findings has been that the mind, while incredibly flexible, appears to have specific limitations in how it can process information, relying on relatively specialized systems in the brain for functions such as vision, attention, memory, motor skills, language, and planning. Key findings have been the role of short-term and long-term memory, language, and skill in knowledge, including a rich idea of what it means to know something. Rather than assuming knowledge to be the ability to correctly recall facts, modern learning scientists distinguish between propositional knowledge, skills, and deeper conceptual knowledge. Additionally, research on individual differences shows that many individuals may learn the 'same' content differently, i.e., forming different representations of the ideas depending on their mental predictions. Useful instructional theories connect to this broader version of knowledge, including Bloom's taxonomy, which highlights the difference between shallow and deeper forms of knowledge (L. W. Anderson et al., 2001).

Another key finding from the learning sciences is insight into the properties of expert thinking (Chi et al., 1988). Studies of chess players have shown that expert chess players not only know more about chess strategies, but their perceptions of chess boards are qualitatively different than novices – they can see problems in a way that leads to more economical thinking about solutions and allows them to better remember the positions of pieces on a board quickly shown to them. Further studies have shown that, in contrast with novices, experts possess a number of strong mental resources in every discipline studied. Experts can improvise to find solutions to problems using so-called weak methods but are often efficient at using known solutions. Many of the skills needed to solve problems are 'automatized,' meaning they can be executed easily without conscious thought (for instance, compare the mental effort required the first time driving a car versus after years of driving). These automatic skills free up attention and memory for other parts of problem solving. In many cases, experts have not only knowledge, smart perception, and skills on their side, they also sometimes have 'mental models' which allow them to predict or simulate how things work in the world before attempting to solve problems. Finally, experts are often very good at monitoring their problem solving and using reflection and planning to achieve their goals (Gentner & Stevens, 1983; Schoenfeld, 1983).

The primary implication of this research for instructional designers and teachers is to appreciate the complexity of expertise and to deepen the ways knowledge is both shared and tested. An emphasis on factual recall is guaranteed to produce 'brittle' knowledge; whereas a focus on the development of instructional interventions that develop complex pattern recognition, build knowledge structures that focus on 'big ideas,' and supporting metacognitive processes are more likely to yield more durable learning.

Research on Learning Processes

Perhaps one of the biggest breakthroughs in the learning sciences was the examination of conceptual change (Vosniadou, 2008). Researchers found that constellations of memories, skills, perceptions, and ideas determined how people think and solve problems. Rather than starting as a blank slate, learners use their initial conceptions to think through problems. While refining that understanding or tweaking it is rather easy, much learning required deep reorganizations of ideas and ways of thinking about the world; for instance,

distinguishing the scientific notions of heat and temperature requires sophisticated new ideas about energy, and suppressing the idea that things with high temperature necessarily have high heat energy (Carey, 1985). This complicated rethinking was not easy and required a great deal of mental energy on the part of learners, as well as careful support from the teachers. And the shifts that took place often mirrored (or were mirrored by) shifts in language (Driver et al., 1996).

Advances were also made in understanding how literacies play a role in learning. On the psychological side, research helped to show the processes by which, for instance, students might decode a text and make it correspond to their ideas about the world (Kintsch, 1998); or might try to coordinate an understanding of the world from multiple sources such as images and text (Mayer, 1993). In other domains, learners might develop understanding hand in hand with developing literacy of another kind, namely, picking up the specialized representations used by experts in a domain, like the notation of mathematics or chemistry (Kozma et al., 1996). Learning these literacies is more than psychologically decoding materials, it is also a social process of sensemaking and meaning making (Schoenfeld, 1991). Over time, learners who use representations socially will start to converge on a shared understanding that has not only formal meaning but social meaning (Roschelle, 1992).

More recently, researchers have begun examining the relationship between literacies, the practices of these literacies in particular contexts, and interest and identity development. Identity and literacies help link what were more traditionally thought of as distinct research traditions on culture, context, and transfer. For example, Nasir (2002) examined the ways African American learners differentially developed practice-linked identities related to math in the context of basketball and playing dominoes, and later how practice linked identities form differently with respect to formal school contexts vs. on the basketball court (Nasir, 2008). This representation of learners as existing in an ecology of learning resources in which they have to develop identity in various cultural contexts has been explored with respect to technology learning (Barron, 2006), science learning (Brown et al., 2006), teacher education (Luehmann, 2007), and as previously mentioned, games and sports (Nasir & Cooks, 2009; Nasir, 2002). Continuing work examines how identity can be viewed as a sociocultural phenomenon, an act of narrative creation, a psychological process of interest development, or some combination of the three (Sfard & Prusak, 2005; Renninger, 2009). As traced by Lee (2008), this linkage between culture, identity, and learning has a long heritage of research in education but was not historically linked to the dominant cognitive models of learning or instructional design. However, the learning sciences specifically, and educational theory more generally, have increasingly acknowledged the cultural and political nature of learning (Esmonde & Booker, 2017; National Academies of Sciences Engineering and Medicine, 2018).

In many cases, this connection to real meaning can make or break learning. Researchers found that relevance and authenticity are crucial elements in this meaning-making process (The Cognition and Technology Group at Vanderbilt, 1990). Students who work on problems that (a) mean something to them personally and (b) are rich and complex enough to invoke real expertise are far more likely to learn. Without authenticity, students might be motivated

to learn within the confines of toy problems, but then would have difficulty applying their knowledge to other domains, the so-called transfer problem (Bransford & Schwartz, 1999).

The instructional implications of this research on processes include focusing on relevant, authentic tasks for learners and focusing on the difficult process of conceptual change. To foster conceptual change, learners need to deeply engage topics in ways that may radically shift their concepts, even while building on their existing conceptions. And the learning needs to take place through literacies and representations that allow the learners to make meaning individually and with others (Bransford & Schwartz, 1999).

Research on Learning Environments

Understanding learning does not always mean knowing how to teach. The findings of the learning sciences in the 1980s and later often had to do with ways of understanding teaching in the new perspective of constructivism – either cognitive constructivism (focusing on the learner as performing a psychological learning process) or social constructivism (focusing on the learner as a participant in a sociocultural process of learning). Bransford and Schwartz (1999) term this the ‘learner-centered classroom,’ although increasingly as educators think about both formal and informal learning, ‘learner-centered learning environments’ might be more accurate.

Perhaps one of the more robust principles in the learning sciences is that one can structure supportive learning environments without resorting to direct instructionist transmission of information. The main metaphor used in the learning sciences to describe non-instructionist teaching is ‘scaffolding’ (Wood et al., 1976). This term, like ‘constructivism,’ has come to mean many things in practice, but the common idea is that, like training wheels on a bicycle, the learner is supported in some way that provides room for exploration and self-directed learning, while still constraining the possibilities so as to minimize unproductive floundering.

Scaffolding takes many forms, ranging from computerized tools that support tasks to activity structures to larger social structures that support learning. For instance, an intelligent tutoring system might permit a learner to make only certain moves as he or she advances through the process of an algebra proof. The computer might use a model of human cognition to ‘follow along with’ the learner. When the computer senses that the learner is not following a reasonable problem-solving sequence, it can leap in with advice or simply limit the possible steps the learner might take (Koedinger, 1998). Or an online lab notebook might use a combination of hints, visualizations, and structured step-by-step supports to help students make sense of a desktop experiment (Linn & Hsi, 2000). Or a scaffolding scheme might not use technology at all. For instance, a technique called ‘reciprocal teaching’ is used in literacy education (Palincsar & Brown, 1984). Students take turns using strategies to comprehend text. Initially the teacher models these strategies, and over time students take the lead practicing them. Even such a simple technique was found by Palincsar and Brown (1984) to dramatically improve how well students learned reading skills. Finally, larger social structures can be used to support learning. One of the predominant theories in this area is ‘cognitive apprenticeship,’ with the idea that learners become ‘apprentices’

of a sort to experts, who model how experts think, coach learners as they practice problems (in context) with feedback, and fade their support and feedback over time to help learners become more autonomous (Collins et al., 1989, 1991). Rather than specifying a particular activity, cognitive apprenticeship spells out a relationship between novices and experts that allows the transfer of expertise and supports learning. Such theories can be used to design social settings in which learners are able to construct an understanding. For instance, ‘computer-supported intentional learning environments’ are a particular structure for classrooms in which learners generate their own questions, then create, extend, and validate a shared knowledge repository (similar to how scholars conduct and share research) with the guidance of a teacher. A key aspect of such environments is that a certain sort of social context must be established, and the means for doing so is often not prespecified, but rather determined by the interaction between existing cultures and social contexts, and the educator’s goals and relationships to those cultures and social contexts (Tabak, 2004).

Recent research in the learning sciences (Dillenbourg, 2013; Prieto et al., 2014; Roschelle et al., 2013) has further studied orchestration of the multilayered interactions that occur in learning environments like classrooms. Dillenbourg (2013) points out that the failure of technology integration in classrooms often lies in the lack of fluidity of classroom interaction around technology. In several studies, and with a variety of technologies, Dillenbourg (2013) and colleagues have shown that effective pedagogical use of technology in classrooms requires teachers to efficiently orchestrate classroom activities. In order to engage students in activities like problem solving, critical thinking, and other complex cognition technology tools cannot be inefficient or non-working. Instead, teachers need to establish the use of technology in activities seamlessly.

The work Dillenbourg describes involves part classroom management (making sure that time is not wasted and instructional time is maximized) and part the creation and use of functional technological tools that can be easily worked with by students and afford rich learning experiences without much down time.

A related development in understanding both learning processes and learning environments is the emergence of *learning analytics* (Lang et al., 2022; Larusson & White, 2014). By using technology, detailed data can be accrued about individual learners and groups over time, often at a much finer-grained detail or larger scale than is possible with typical classroom observation. Such data can be used for scientific research but can also feed into technology-mediated orchestration systems. This data may come from computer logfiles of online activity or, increasingly, from synthesis of data collected across modalities (e.g., clickstreams plus audio data processed by speech recognition, or AI-based gesture and facial expression detection from image processing) (Giannakos et al., 2022).

The concept of orchestration can be useful in that instructional strategies that afford learning in student-centered instruction emerge from the synergy of activities. Unlike in teacher-centered classrooms, where the events of instruction are fairly predictable, ordered, and controlled by the teacher, instructional moments in student-centered learning environments are dependent on students being synchronized with the instructional activities that the teacher guides them to in the classroom. Technologies that

keep students engaged are the ones that are most likely to afford learning. For example, Prieto et al. (2014) describe work done with ‘augmented paper’ where students interact with paper objects containing icons that interface with computers. One instance that was widely studied involved using paper to design logistical systems in warehouses. Another simple but useful technological tool involved a lamp that alerted tutors concerning the wait time for students in need of help. The lamp system reduced the wait time for students by directing the tutors to the students who were waiting the longest for help. Consideration of technology and pedagogical strategies that improve classroom logistics can be of use to instructional designers as they build and implement instruction. While designers are knowledgeable of instructional strategies for student-centered classrooms, research or models in instructional design on how to orchestrate the successful implementation of student-centered instruction across people, tools, and resources are more nascent.

CONCLUSION

As stated earlier, the goal of this chapter has been to describe the learning sciences perspective and provide some insights that may prove useful to instructional designers. *How People Learn* (Bransford & Schwartz, 1999) summarizes this for designers and educators as the need for classrooms to be learner-centered, knowledge-centered, feedback- or assessment-centered, and community-centered. Sawyer (2006b) summarizes this as a focus on conceptual understanding, putting learning processes on par with teaching processes, aiming for authenticity, building on prior understanding, and providing opportunities for reflection.

For further reading, we recommend the journals *Journal of the Learning Sciences*, *International Journal of Computer-Supported Collaborative Learning*, *Cognition and Instruction*, and *Mind, Culture, and Activity*; the excellent volumes *How People Learn* (Bransford & Schwartz, 1999) and *How People Learn II* (National Academies of Sciences Engineering and Medicine, 2018), the *Cambridge Handbook of the Learning Sciences* (Sawyer, 2006a), the *International Handbook of the Learning Sciences* (Fischer et al., 2018), the *International Handbook of Computer-Supported Collaborative Learning* (Cress et al., 2021), *Power and Privilege in the Learning Sciences: Critical and Sociocultural Theories of Learning* (Esmonde & Booker, 2017), and *Knowing, Learning, and Instruction: Essays in Honor of Robert Glaser* (Resnick, 1989). For more on the relationship between the learning sciences and instructional design, we can recommend a special issue on the topic in the magazine *Educational Technology* (2004, vol. 44, no. 3) and the edited volumes *Design as Scholarship: Case Studies from the Learning Sciences* (Svihla & Reeve, 2016) and *Participatory Design for Learning* (DiSalvo et al., 2017).

In summary, research in the learning sciences has implications for instructional design by deepening our ideas about thinking and knowing, by illuminating the learning processes individuals go through, and by highlighting how learning environments can be designed to support learning. While this chapter cannot encompass everything, we have attempted to identify some major insights that may prove most useful.

Summary of Key Principles

1. Learning must be understood as a multidisciplinary phenomenon rather than just a psychological one.
2. Our understanding of learning and instruction is not limited to that which we learn through experimental research studies conducted in laboratory settings. The process of instructional design can yield artifacts, tools, strategies, and ideas that enable us to get a clearer understanding of how people learn.
3. Much of learning is a social process where people interact with others; thus, learning contexts, culture, and shared ways of making meaning are as important to analyze as individual learner characteristics or psychology.
4. Vygotsky's concept of the zone of proximal development suggests that it is important for instructional designers to pay attention to how interactions between experts and novices can be structured to support the development of novice learners. In addition, sociocultural and sociopolitical theories in learning sciences suggest that systems of activity, culture, and power must be attended to.
5. Learning environments can be designed that structure and support learning through scaffolding without resorting to traditional lecture techniques that view teaching as just transmitting knowledge.
6. The creation of learning environments that are authentic and relevant, as suggested by situated learning theorists and embodied in approaches such as anchored instruction, is important to the development of expertise (not just factual or procedural learning) in students.
7. Technology (both computer technology and other forms) can be thought of as creating tools that can transform thinking and learning. With AI, technology can also be used not only as a tool for learning but also as a way to model thinking.
8. Exploring expertise within a field can yield important information about how to design instruction within it.

Application Questions

1. As an instructional designer you are asked to design an apprenticeship program for electricians. What are some ways in which taking a learning sciences perspective can help you to carry out this task? Describe the elements of the learning sciences that would help you with the task. How would knowledge of how expertise develops help you to create an effective apprenticeship program?
2. The traditional ways we teach science in schools has been to teach children science concepts and vocabulary primarily through lectures. You have been hired by a school district to redesign their physical science curriculum for seventh grade. The school district wants something other than lectures and canned laboratory exercises, but also feels that just giving students hands-on activities where they explore materials will not provide them sufficient experiences to learn. Use what you know about the learning sciences to describe the kind of curriculum you would develop. What are some principles

- of the learning sciences that you would apply to the curriculum? What kinds of instructional activities would you include? How would you design the learning environment? How would it differ from the traditional classroom environment?
3. One aspect of the learning sciences is that technologies are viewed as tools for distributing workload, intelligence, and facilitating

learning. Pick a technological advance or tool and describe how it can help facilitate learning from the learning sciences perspective. Provide an example of a context where it has the potential to transform how one learns. Examples of possible technologies include, email, blogs, discussion groups, video conferencing, interactive video, handheld computers, iPods, smartphones, and so on.

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Motivation, Volition, and Performance

John M. Keller and Markus Deimann

Ashley, a 24-year-old student, is in her first semester of a new master's program in educational psychology. Her introductory course is in a blended mode with a kick-off phase at the campus, an occasional meeting during the semester, and a large amount of independent study. She is happy to discover that this course utilizes many innovative technologies, such as Weblogs, E-Portfolio, and Wikis. She is loving all the innovative teaching methods and strategies, and one day she enrolls in a class that has an even newer and more innovative method of organization. Basically, she is expected to build her own course by selecting and organizing content and learning activities in cooperation with other students, which can result in a personalized and unique experience. She is even able to include other educators in her overall network of participants, which is supposed to result in a truly individualized experience.

She is excited by the opportunity to add an elective course of personal interest and to experience still another innovative approach to course delivery, so she enrolls in it. Consequently, her motivation is very strong, and at first she is able to manage her activities and assignments without any problems. However, after a while the independent study assignments, especially the group activities, become more demanding, other courses require more attention, and she spends more and more time socializing with her new friends in the master's program. Thus, Ashley's motivation for this course does not remain as strong as it was, and she gets behind in her schedule. As she approaches the course deadlines, she is still having motivational problems, and she finds it difficult to maintain a strong level of effort to excel on her tasks even though she wants to do well.

Ashley's efforts to regain strong motivation, avoid the distractions that have developed during the semester, and focus on her work require a special form of energy that is different from motivation. Called "volition," it is beyond motivation and targeted on overcoming obstacles and hindrances during the learning process. Knowledge of the concepts related to this "special form of energy" is highly relevant for instructional designers because these concepts

offer detailed knowledge that supplements knowledge of motivational processes and how to maintain one's persistence and performance. The purpose of this chapter is to provide an overview of principles of motivation and volition, how they are incorporated in a systematic motivational design process, and how they relate to challenges to motivation and persistence faced by all students at one time or another.

Concerns for learner motivation and motivational design processes have been growing in instructional systems design since the publication of Keller's (1979) article "Motivation and Instructional Design: A Theoretical Perspective." Certainly, there was a large existing psychological literature on motivation, but it did not provide an adequate understanding of how to integrate motivational principles into a design process. Since 1979, there has been a steady growth of interest in this topic as a result of the work of people such as Wlodkowski (1999), Brophy (1998), the continued work of Keller (J. M. Keller, 1999, 2008b, 2010), and the inclusion of the concept of volition, or self-regulation, in motivational design investigations of factors that facilitate or impede learner persistence (Astleitner & Hufnagl, 2003; Deimann & Keller, 2006; Kim & Keller, 2008), especially in distance education (Deimann & Bastiaens, 2010).

Even though there has been this increased activity, it can still be difficult for an instructional designer to obtain a quick overview of this literature and its relevance. Consequently, we have formulated six questions that provide a structure for understanding the current situation; the major characteristics of motivation, volition, and motivational design; and trends in this area of activity.

WHAT DO I NEED TO KNOW ABOUT MOTIVATION AND VOLITION? WHY SHOULD I HAVE TO KNOW ANYTHING ABOUT IT IF MY FOCUS IS ON INSTRUCTIONAL DESIGN AND TECHNOLOGY?

Employers complain that instructional design and technology graduates who are well versed in the various authoring and graphics applications for designing computer-based and web-based instruction often produce instruction that is pedestrian, if not actually boring, and not sufficiently effective. To produce high-quality products, instructional designers must be thoroughly grounded in the processes of both motivational and instructional design. Recognition of this is illustrated by several instructional design texts that now include a section on motivational design (Dick et al., 2015; Medsker & Holdsworth, 2001; Smith & Ragan, 2005).

Another reason for developing competency in motivational design is the trend to move from the somewhat narrow perspective of instructional design to the broader perspective of human performance technology (HPT). From this perspective, instructional designers must understand and be able to identify all of the factors that influence human performance, which certainly includes motivation.

WHAT IS MOTIVATION (AND WHAT ISN'T IT; THAT IS, WHAT IS IT DIFFERENT FROM)?

Most writers in the field of HPT (Gilbert, 1978; Porter & Lawler, 1968; Rummler & Brache, 1990) identify three major categories of influence on

performance. These can be classified as capability, opportunity, and motivation (J. M. Keller, 2008b). *Capability* refers to a person's knowledge, skills, and aptitudes, which determine what a person is able to do. *Opportunity* refers to resources and information that are necessary for a person to perform a task. These can include clear statements of goals, instructional content and tests that are matched to the goals, availability of tools and equipment, sufficient time to perform the task, and guidelines for performing the job. Finally, *motivation*, in its broadest sense, refers to a person's desire to pursue a goal or perform a task, which is manifested by choice of goals and effort (persistence plus vigor) in pursuing the goal.

To design effective learning environments, or to develop holistic programs of human performance development, the instructional designer must understand and integrate all three of these components in relation to their influences on effort, performance, and satisfaction (J. M. Keller, 1983a, 2008b, 2010). The motivational element is particularly important because it pertains to a person's basic decisions as to whether to accept responsibility for a task and to pursue a given goal. Without this initiation of behavior, none of the other things matter.

WHAT ARE SOME OF THE KEY ISSUES REGARDING MOTIVATIONAL DESIGN PRINCIPLES AND PROCESSES?

Issues in the Study of Motivation

Three issues that pervade the study of motivational concepts are intrinsic versus extrinsic motivation, states versus traits, and the affective versus cognitive domains.

Intrinsic versus extrinsic motivation. Intrinsic motivation (Deci, 1975) occurs when one engages in a task for which there is no apparent reward except the pleasure of the activity. In contrast, extrinsically motivated individuals engage in tasks for rewards associated with successful accomplishment. Naturally, there can be a mixture of the two elements in a given situation, but there can also be conflicts such that extrinsic rewards reduce one's intrinsic motivation for learning (Deci, 1971; Lepper et al., 1973; Lepper & Greene, 1978). However, extrinsic motivation, when carefully prescribed, can be used to build learners' intrinsic motivation (Kruglanski et al., 1975). The effective use of feedback and reinforcement must consider these relationships.

Trait versus state. Motivational characteristics, like other psychological characteristics, have been conceptualized as both traits and states (Brophy, 1998; J. M. Keller, 1983b; Rotto, 1994). A "state" is a condition brought on by a situational stimulus or process, whereas a trait is a stable psychological drive or motive. Berlyne (1965) indicates that curiosity, for example, can be a trait, but it also has state characteristics; that is, people differ in their stable, trait-level degree of curiosity, but some situations will awaken state curiosity more than others. Rotto (1994) made the same point in regard to intrinsic motivation and other motivational variables.

Affective versus cognitive domain. Some theorists have considered motivation to be contained within the affective domain and call motivational

factors “non-cognitive” variables (Messick, 1979). The affective domain does, indeed, include emotions which are an essential part of motivation (Astleitner, 2001). However, motivation also has cognitive components. For example, attributional theories of motivation (Rotter, 1966; Weiner, 1974) are primarily cognitive. These theories focus on people’s interpretations of the causes of outcomes and their perceived value as major influences on the goals they pursue.

Issues in the Study of Volition

Volition represents an old variable in the study of human behavior which can be traced back to the beginning of scientific psychology (James, 1890). It is targeted on explaining phenomena of goal-directed processes, such as persistence. The ultimate purpose of volition is to help people stay on task and overcome difficulties. In this regard, volition has been conceptualized as several interrelated control processes that facilitate goal-striving behavior (Kuhl, 1984). One of them is attention control, or selective attention, which shields a current intention against other, competing stimuli. To illustrate this mechanism, we would like to refer to our student Ashley, who needs to complete an assignment in her network before the weekend or risk falling hopelessly behind, especially with all the deadlines in her campus courses. After logging in to her group, she starts with a few thoughts and gets absorbed by the interesting topic. Yet, after a while, she suddenly is thinking about the upcoming birthday party of her best friend. She has promised to assist her friend because this will be a big event with a lot of people she has not seen in a while. This leads to an inner struggle between two highly valued goals: completing the assignment satisfactorily versus spending time preparing for the birthday party. This is the point when volition can come into play and help people overcome such kinds of conflicts by focusing their attention on task-relevant issues and blinding out irrelevant thoughts.

Another important characteristic in the analysis of volition pertains to the ego-depletion effect (Muraven & Baumeister, 2000). Based on empirical data, the exercise of volitional control is like exercising a muscle; it can be exerted with great energy for a limited period of time but then becomes fatigued and requires rest in order to regain strength. Thus, volitional actions should not be applied over a lengthy period of time. The actual degree is subject to individual differences; that is, there is no general specification such as, for example, “the volitional muscle can only work for 3 hours a day.” The instructional designer must design learning materials and environments in such a way as to keep distractions at a minimum and thus reduce the load on volitional efforts. This is analogous to avoiding unnecessary complexity or ambiguity in learning materials in order to minimize extraneous, or non-task-oriented, cognitive load (Pass et al., 2003).

In summary, these motivational and volitional issues are present in much of the literature on these topics, but they do not provide a sufficient basis for motivational design. There are two major requirements for establishing a systematic approach to motivational design. The first is to understand the major elements of human motivation and volition, and the second is to employ a design process that assists in diagnosing a learner’s motivational requirements and prescribing appropriate tactics. The next two sections of this

chapter provide a brief introduction to major concepts and theories of motivation and volition and give an overview of design approaches.

WHAT ARE THE MAJOR CONCEPTS AND PRINCIPLES OF MOTIVATION AND VOLITION, IN PARTICULAR THE ONES THAT WILL BE USEFUL FOR ME TO KNOW?

There are many characteristics of human beings that must be considered in understanding motivation and volition, and it can be extremely challenging to comprehend the full array of them from a direct reading of the literature. There are several syntheses (J. M. Keller, 1983b; J. M. Keller & Burkman, 1993; Wlodkowski, 1999) and contemporary textbooks (Brophy, 1998; Pintrich & Schunk, 2002; Weiner, 1992) that are helpful, but one is still faced with a broad spectrum of concepts, theories, and research.

However, Keller (2008a) has proposed a set of “first principles” of motivation that were derived from a synthesis of motivational and volitional constructs. The first four of these were first introduced in 1979 (J. M. Keller, 1979) and were elaborated in 1983 (J. M. Keller, 1983b), but they were not called “first principles” at that time nor were they stated in the current manner (J. M. Keller, 2008a) as basic principles of motivation to learn. In the current formulation there are five principles, and each has a theoretical basis in key motivational and volitional concepts (J. M. Keller, 2010). The five principles are:

1. Motivation to learn is promoted when a learner’s curiosity is aroused due to a perceived gap in current knowledge.

Broadly speaking, curiosity is aroused by uncertainty or a desire to close a perceived gap in one’s knowledge due to such things as unanswered questions or unresolved conflicts. One of the best-known researchers in this area is Berlyne, who introduced a distinction between perceptual and epistemic curiosity (Berlyne, 1965). Perceptual curiosity is characterized by reflexive reactions to unexpected and intrusive stimuli such as a loud noise or unexpected movement detected in one’s peripheral vision, and it is resolved as soon as the cause of the stimulation is perceived and determined to not be dangerous. Epistemic curiosity refers to a desire to gain knowledge to explain the causes of gaps in one’s understanding or why something is happening the way it is (Why is my car engine making that noise? What did Einstein mean by $E=mc^2$? What technique can I use to remember the geographical locations that are likely to be on the test?).

It is also necessary to understand the dynamics of boredom (Geiwitz, 1966; Vodanovich, 2003) in order to understand curiosity. Boredom is not necessarily the opposite of curiosity; boredom results from being in an environment that is filled with uniform, unchanging stimuli such as a warm classroom with an instructor lecturing in a soft, uninflected voice. It is possible to be curious about the topic but so bored by the delivery method that sleep is inevitable. People differ in their needs for excitement and stimulation (Zuckerman, 1979): Those who have higher sensation-seeking needs have higher levels of boredom susceptibility and will require more frequent changes of topic, instructional tactics, or media to remain engaged in the learning process.

2. Motivation to learn is promoted when the knowledge to be learned is perceived to be meaningfully related to one's goals.

Goals can be of many types. They can be concrete and specific, such as earning an A in a specific course, getting a job with an accounting firm, or driving from Tallahassee to Houston in fewer than 11 hours. Goals can also be nonspecific and even emotionally based, as in wanting to feel good about oneself, having opportunities to enjoy friendly interactions with other people, or being successfully engaged in challenging activities. All these goals can become a source of creating feelings of relevance among students. This is in contrast to a frequently held assumption that instruction must be perceived to be useful in order for students to consider it to have relevance. Perceptions of usefulness or "authenticity" in a learning task contribute to relevance, but they are not the only important components.

Relevance can also be achieved by creating meaningful challenges, especially for people with high needs for achievement, and giving them a measure of control over setting their goals and the means of accomplishing them (Alschuler et al., 1971; McClelland, 1984). A related factor is the more general concept of interest. As Dewey pointed out, effort by itself might lead to accomplishment, but it does not lead to motivated goal pursuit unless there are high levels of interest (Dewey, 1913), which in his conceptualization was a type of intrinsic motivation. Among other factors that help produce relevance are activities that contribute to increases in a person's feelings of competence (White, 1959).

3. Motivation to learn is promoted when learners believe they can succeed in mastering the learning task.

A central concept related to building confidence in mastering learning tasks is that of control. The belief or actuality of having control over a situation underlies many of the psychological constructs in this category such as locus of control (Rotter, 1966) and attribution theory (Weiner, 1974). These concepts refer to the degree to which people believe their achievements are the result of their own abilities and effort versus luck or other uncontrollable influences. Another related concept is self-efficacy (Bandura, 1997), which refers to the extent to which people can plan and implement behaviors that will result in successful goal accomplishment.

When people do not have positive expectancies for success or when they have been unable to avoid failures and catastrophes over which they have no control, they can develop feelings of helplessness. Called learned helplessness (Seligman, 1975), this condition refers to people who absolutely believe that they cannot succeed at a task even though they could succeed if they exerted sufficient effort. This condition can be overcome with strategies that help students attribute the outcomes of their behavior to their abilities and skills instead of luck or uncontrollable factors (Dweck, 2006).

4. Motivation to learn is promoted when learners anticipate and experience satisfying outcomes to a learning task.

Feeling good about accomplishments and not feeling inappropriately bad when not successful is a result of several external and internal

factors. External factors include the use of reinforcement contingencies that provide appropriate rewards for accomplishments. There is a long history of behavior management strategies based on the systematic use of rewards and penalties in accordance with operant conditioning principles (Beck, 1990). Extrinsic reinforcement can sometimes have an undermining effect on intrinsic interest (Condry, 1977; Deci & Porac, 1978; Lepper & Greene, 1975). A primary reason for this might be that the use of reinforcement contingencies to manage another person's behaviors tends to take personal control away from that person and put it in the hands of the performance manager (deCharms, 1968; Harlow, 1953; Hunt & Sullivan, 1974; White, 1959). Thus, it is usually best, with regard to maintaining motivation to learn, to use feedback that is informational instead of controlling. In other words, use of feedback that reinforces a student for successfully completing an optimally challenging task by including a congratulatory comment together with an internal attribution for success helps sustain intrinsic satisfaction (Brophy, 1981).

5. Motivation to learn is promoted and maintained when learners employ volitional (self-regulatory) strategies to protect their intentions.

It is questionable that learners always follow a direct, uninterrupted path from goal setting to goal achievement. Instead, students pursue not one but multiple goals aimed not only at learning but also at a variety of positive experiences. Thus, different goals interact in complex ways and change over time. For example, there is one type of priority given to growth goals (e.g., to deepen one's knowledge base); another type of priority is given to maintain emotional well-being (e.g., to look smart and protect one's ego). In cases when those goals collide, volitional strategies can help students prioritize their goals and avoid being distracted by those that are less important at a given moment (Kuhl & Kraska, 1989). However, this requires that students have facility in using volitional strategies.

When it comes to applying volitional strategies and concepts to an educational context, three basic steps have appeared to be useful. The first step involves a comprehensive assessment of a person's motivational and volitional characteristics. The second step pertains to intervention and entails a careful inspection of the learners' motivational and volitional profiles. The third and last step is about the evaluation of the treatment (see Kuhl et al., 2006; Kuhl & Fuhrmann, 1998; McCann & Turner, 2004; Deimann & Bastiaens, 2009). This can be carried out in a relatively straightforward manner by comparing the persons' motivation and volition function prior to and following the treatment.

Positive effects of utilizing volitional strategies have been reported in numerous studies. Pintrich and Schunk (2002) stress the importance of volition for college students "who, when you talk to them, are very motivated and concerned about doing well, but often have a very difficult time enacting their intentions, given all the internal and external distractions they confront in college life" (p. 126f). In a similar vein, Wolters (2003) highlighted the usefulness of volition in explaining how students

manage distractions or other problems that might interfere with the timely completion of academic work. In this regard, it has become clear that motivational beliefs (e.g., task value, learning goal orientation) can be used to explain volition regulatory strategies (e.g., environmental control, interest enhancement) (Wolters & Rosenthal, 2000).

A major purpose of this chapter is to highlight the distinction between motivation and volition. Although both refer to the same overall principle, which is to facilitate goal-directed behavior, there are noteworthy differences, especially with regard to their implications for instructional design.

HOW CAN I APPLY THIS KNOWLEDGE OF MOTIVATION AND VOLITION IN THE CONTEXT OF INSTRUCTIONAL DESIGN AND HUMAN PERFORMANCE TECHNOLOGY?

The effort to build applied models of motivation is not new, but the emphasis has changed. Whereas early models tended to focus on one specific motivational characteristic such as the achievement motive, more recent ones are trying to incorporate a broad variety of relevant concepts in a holistic approach.

To do this, one has to estimate learners' motivational characteristics and then design the learning environment to match the students' motivational requirements. This implies that one must work holistically with motivation and not be limited to one or two specific motivational characteristics.

There are two well-published models of motivational design that are holistic: the time-continuum model of Włodkowski (1999) and Keller's ARCS model (J. M. Keller, 1984). Włodkowski's model contains categories of motivational tactics and prescribes when to use them during an episode of instruction. The questions of how many tactics or specifically what kinds of tactics to use are left to the teacher's judgment.

The ARCS model also contains categories of motivational strategies and tactics, but it contains a systematic design process that includes an analysis of audience motivation to determine the number and types of appropriate tactics to include.

The full application of the ARCS design process has 10 steps (J. M. Keller, 1987, 1999, 2010) ranging from analysis through design and development to evaluation, and it integrates well with lesson planning and instructional design processes. The process begins with information about the lesson or course to be enhanced, the teachers (if it is an instructor-led course), and the students. It then proceeds to an analysis of the audience and current materials for the course. Based on this information, the designer or teacher can write motivational objectives, select or create motivational tactics, and then develop and test them (Keller, 2010).

Both models are similar in that they focus more on generating motivation than on ways of sustaining persistence until the learning process is finished. Research on student support has been done in the context of the ARCS model to help students sustain their efforts in the face of compelling distractions (Visser & Keller, 1990), but this research did not systematically incorporate ways of managing the motivational fluctuations that might be encountered. For instance, our student Ashley might realize that her upcoming group activities and assignments require much more time and effort than she initially

thought. This creates conflict and pressure on her, and she starts wondering whether she will be able to master the task. As a result of this, her motivation wanes and she is having problems maintaining her effort. Such a situation is not very unusual when trying to concentrate on learning, especially in settings that require a high level of self-regulation.

Models of motivational design tend not to adequately account for these situations. Therefore, it would be beneficial to integrate volitional conceptions into motivational design to have a more comprehensive framework that can effectively explain typical motivational problems (Deimann, 2007; J. M. Keller, 2008b). Major aspects of Deimann's (2007) approach to integration includes an instrument to assess volitional competence and a pool of volitional strategies that can be utilized based on the person's profile and the conditions of the learning environment.

WHAT ARE THE TRENDS OR FUTURE DIRECTIONS IN MOTIVATIONAL AND VOLITIONAL RESEARCH AND APPLICATION TO LEARNING ENVIRONMENT DESIGN?

Research and development with motivation and volition is a broad and seemingly growing area of interest based on the constantly growing number of articles in major journals on these topics. However, there are two trends that are specifically relevant to the field of instructional design and technology.

First, there continues to be growing interest and research on motivation in web-based instruction, computer-based instruction, and distance learning. In most distance learning contexts the non-completion rate is undesirably high and learner motivation problems are generally considered to be a primary cause. However, the number of formal studies is fairly small, although growing (L. Visser, 1998). With respect to computer-based instruction, Song (1998), building on the work of Astleitner and Keller (1995), demonstrated how one can produce motivationally adaptive, computer-based instruction. He embedded motivational self-checks in a lesson. Based on the learner's responses, the computer determined the amount and type of motivational tactics to use in the subsequent segment of the lesson.

Second, there continues to be interest in the design of blended learning environments, which have their own motivational challenges, especially in large enrollment courses. An approach that has been taken in this context has been to provide motivational and volitional support to students by using motivational messages delivered via email as part of the online portion of the course (J. M. Keller et al., 2005; Kim & Keller, 2005).

CONCLUSION

Even a casual comparison of today's instructional design and educational psychology literature with that of 15 years ago illustrates a dramatic growth of attention to motivational and volitional (or self-regulatory) factors in learning and performance. As with any field of research on human learning and performance, there is much to be learned, but there is also much that has been learned. In the past, motivation was generally regarded as being too elusive and changeable to encompass in a holistic theory or model of explanation and

prescription. However, as shown here it is possible to build valid, systematic approaches to understanding and influencing learner motivation and persistence, and this contributes significantly to the larger pictures of learning environment design and human performance development.

Certainly, the field of instructional design can benefit from current research and practices in motivation and volition. Inasmuch as what causes someone to learn is never a precise science with easy-to-follow guidelines, incorporation of motivational techniques is essential to maximize learning. As stated earlier, motivation is an internal construct embedded in personal experience and expectations. Instructional designers must not only be fully cognizant of the entire range of motivational methods and models available, but also must know how to integrate them into a variety of instructional situations. Even the most accurate content, related activities, and diligent preparation can be ineffective without the systematic incorporation of motivation and volitional strategies.

Summary of Key Principles

1. Motivation to learn is promoted when a learner's curiosity is aroused due to a perceived gap in current knowledge.
2. Motivation to learn is promoted when the knowledge to be learned is perceived to be meaningfully related to one's goals.
3. Motivation to learn is promoted when learners believe they can succeed in mastering the learning task.
4. Motivation to learn is promoted when learners anticipate and experience satisfying outcomes to a learning task.
5. Motivation to learn is protected and maintained when learners employ volitional (self-regulatory) strategies to protect their intentions.
6. Instructional designers and teachers can predictably influence motivation and volition in a positive way by applying a systematic process of design.

Application Questions

1. You see a room where learners are smiling and happy and the instructor is entertaining. You go into the classroom next door and the learners have serious expressions on their faces and are hunched over their desks with pencils in their hands. Would you assume that the learners in the first room have positive levels of motivation to learn and the ones in the second room do not? What indicators (evidence) would you look for in addition to the ones previously mentioned?
- What evidence would support a conclusion of high levels of motivation to learn in one or both of the classrooms? How do the concepts of engagement versus entertainment fit in here?
2. Do additional research on Wlodkowski's time continuum model of motivation and then describe two or more situations in which his model would provide useful guidance. When it is time to prepare a list of specific motivational tactics to use in a given situation, how

would the decision-making process be different with the ARCS model than with Wlodkowski's time-continuum model?

Clue: With the ARCS model, what is the process for determining what motivational tactics are appropriate?

3. Ashley is elated to be accepted into the LPN (Licensed Practical Nurse) program at her local state college. She is thrilled because she has held this goal for many years. Her intention is to successfully complete the program, but beyond that, she wants to finish in the top 5 percent of her class. She begins the semester with hurricane intensity and receives top grades on everything as well as the admiration of her instructors. Midway through the semester, she is invited to join the women's volleyball team after a friend observes her excellent skills during a pick-up game with friends. She is almost immediately added to the varsity team and finds the competition and field trips to the games at other schools to be exciting and satisfying. What kind of effect might this new goal have on her previous goals regarding her LPN program? What can she do to protect her original intentions? Use key concepts from this chapter in formulating your answer.
4. Search the web using these two descriptors: *arcsmodel* and "arcs model". Be sure to use quotation marks around the two words ("arcs model"). Find two examples of postings in which people describe the ARCS model, an instructional design application of it, or a research project incorporating it. Describe and critique each example with regard to how accurately and completely it incorporates the key elements of the ARCS model.

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Profound Learning for Human Flourishing

*Davin J. Carr-Chellman,
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There are, then, two paths: the deep and the wide.

– Goleman and Davidson (2017, p. 3)

Going through the checklist again, Chris sighed. “OK, I can check off operationalizing goals. Now on to evaluation. How many times have I duplicated this process over the years? Too many. Same ol’, same ol’.”

Chris was an experienced, sought-after instructional designer and had created many effective training courses over the past ten years. The excitement of developing something that *actually worked* – that prepared learners with the skills and knowledge to do what was needed – had been heady for the first years. Both managers and students expressed their appreciation for the expert work time and again. But now Chris felt a vacuum and reflected, “What difference do all these instructional activities really make in the world?”

Chris remembered the book that had sealed the deal years ago, back when he was trying to make a career choice. *Teaching from the Heart* by Jerold Apps (1996) had been an inspiration. “To teach from the heart,” Chris remembered from the book, “we must know how to learn from the heart” (p. 19). He recalled that at the time he had said, “*That’s* what I want to do. I want to teach from the heart and to learn from the heart. I want to make a difference in people’s lives.” That led to a master’s degree in instructional technology where Chris took to learning design like a duck to water. Teaching itself, it turned out, had been put on the back burner as Chris’s instructional design (ID) career blossomed.

Now Chris sat back and thought, “There has to be more than repeating this same process over and over.” Searching through his bookshelves, Chris

finally found *the* book by Apps (1996). Flipping through the pages, a highlighted section seemed to call:

Thus teaching and learning have sometimes become technical endeavors no different from feeding raw material into a machine. The person is the learning machine. What is learned is the product. The teacher is the machine operator and a source of raw materials. Simple and straightforward. Feed in facts and information. Use advanced technology such as computers or video machines so boredom doesn't shut down the learning machine. Provide standardized tests to make sure the facts and information 'took' and that's it. Simple enough.

(p. 6)

Chris shook his head and asked himself, "How did I become such an assembly line programmer? I love my career and I'm good at it, but how can I get back to 'designing' from the heart?"

INSTRUCTIONAL DESIGN AND PROFOUND LEARNING (PL) FOR HUMAN FLOURISHING

As Chris's ID experience illustrates, learning and its design, when abstracted and isolated from core human experiences and purposes, can feel empty and shallow. Apps's notion of learning from the heart captures the spirit and direction of what we propose as Profound Learning (PL) for human flourishing.

PROFOUND LEARNING

PL is a formative process emphasizing the learner's commitment to practices across time that are grounded in intentionality and form, transform, deform, and reform a learner. Forming, or identity formation, is the overall process of human learning that is constituted by the sub-processes of transformation, deformation, and reformation. These sub-processes are not discrete, instead representing related but distinguishable moments in a learner's formative journey. Transformation is durable, meaningful change. Deformation is less durable, disruptive, or distorting change. Reformation is change that reconfigures and reconstitutes the learner in a different and improved way. Intentionality, the origin of learning and the foundation of human experience, is the interface between subjective mental states and the objective world external to those mental states. This learning occurs continuously, recursively, and reflexively, while the depth of learning depends on the disciplines engaging the learner. Accordingly, PL is characterized by rich, deep, durable, and meaningful experiences, stressing that learners can cultivate these kinds of experiences through particular disciplines.

The most prominent characteristic of PL is deep learning through deep reflection and examination, which highlights the patient, reflective, and continuous nature of PL. The second most prominent characteristic of PL is gaining insights, awareness, or knowledge that is substantial, which highlights resistance to superficial or easy answers. The third most prominent characteristic of PL is meaningful learning, emphasizing the richness of the impact on the learner. The

fourth is perspective changing, which locates PL in the adaptability and agentic nature of the learner. Fifth is changing who one is in relation to self, others, and context, which captures the relational, mutually influential aspect of PL. Sixth is depth of knowledge, indicating the durability of the process and outcomes of PL. Seventh is experiencing or understanding the vastness of things beyond what one has assumed to be true, which characterizes the transitory and provisional nature of much that we think of as knowledge. The eighth most prominent quality of PL is a reevaluation of previous ideas or values. This quality calls out the relationship between experience, learning, and the virtues guiding our decisions. Ninth is paradigm changing, characterizing PL as a fundamental reorientation to some aspect of the world. Lastly, PL is thought to be gaining insights, awareness, or knowledge that is consequential, meaning that, over time, there are real effects on a learner's life as a result of the learning (Kroth & Carr-Chellman, 2020b).

The depth of growth that occurs through PL emphasizes complex thinking, deepening, seeing things from multiple perspectives, throughout a lifetime enacting transformative change that creates new perspectives and explorations that look for ongoing deepening from specific practices or disciplines. (Kroth et al., 2022).

HUMAN FLOURISHING

Importantly, as the disciplines, practices, habits, and dispositions for PL develop in a learner, human flourishing is a desired and likely outcome. Situating instructional design work in the context of human flourishing draws on ancient philosophical traditions centering on Aristotle (Brown, 2009) and Thomas Aquinas (1981) but also connects directly to more modern thinkers such as Martha Nussbaum (2001) and Alasdair MacIntyre (2007). In general, human flourishing enlarges the extent to which persons can experience happiness and self-actualization through recognizing, pursuing, and fulfilling their purposes in life. Human flourishing is not a linear or static condition that, once achieved, is part of one's experience or character forever. It is more like an activity engaging the particular disciplines and practices tied historically, socially, and contextually to one's purposes as a human being.

From the perspective of an instructional designer, this is an end-in-view, longitudinal approach that never abstracts a learning or instructional event from the ultimate purpose for which it exists: human flourishing. As a historically and socially constituted activity, communities, institutions, organizations, and families, among others, bear directly on one's capacity for flourishing. Learning in this context, can no longer be interpreted as a singular event framed by the goals and objectives of a particular task. Instead those goals and objectives are always embedded in an active arc-of-learning across time, connecting experiences and offering continuity for learners through discipline-focused practices and habits.

THE FOUNDATIONS OF PL FOR HUMAN FLOURISHING

The foundational principles of PL are:

1. There is infinite knowledge and no individual person, or even all persons aggregating all existing knowledge, will ever exhaust what can be known. Consequently learning, and learning more deeply, is never-ending.

2. Following from the first, any pedagogy of PL must operationalize life-long learning because there is no endpoint to learning. There can be no complete answer; therefore, instructional practices for PL must seek to open up, to ask, and to continuously reveal and reconsider rather than to close down, to consider answered, or to be completely discovered.
3. Consequently, developing practices for exploring daily ever more deeply is essential to PL. Disciplines of inquiry, relationship-building, multiperspectivity, synthesis, interpretation, and other generative learning practices will prepare learners for an ever more complex world.
4. Therefore, to be PL, lifelong learning is not merely a set of learning events, types of learning, activities, or phases, but rather a continuous formation process (Kroth et al., 2022, p. 27).
5. As a formative process situated in the context of deeper learning across time, PL provides a framework for the application of diverse learning theories, creating a more comprehensive approach to human flourishing, the ultimate goal of lifelong learning.

An important implication of these foundations is the multivalent nature of human learning and the nuanced approach to instruction required as a result. In particular, for the instructional designer, the immediate specifics of the learning situation at hand are significant but should not be an excuse to neglect the always-necessary broader and longer view of deeper meaning.

Good learning proceeds from a sense of identity formation and an appreciation for who the learner is and where they are heading. In this way, learning is always informed by a sense of what is worth learning and why it is worth learning. Whether we like it or not, learners are always fully and iteratively immersed into processes of transformation, deformation, and reformation. Being cognizant of, responsive to, and instructionally strategic about the evolutionary situations where individual learners are bound to find themselves is a significant responsibility.

Designing for PL requires connecting learning opportunities over time that enable progressively deeper learning, understanding, and practical wisdom. It is not simply designing one-off instruction, but rather creating an infrastructure for learning, the architecture as well as the building blocks, the instructional design management as well as the individual course instruction. It is not just repeating the same statements on the same topics every time, but progressively going deeper each time. Here it is important to distinguish between earlier models of recursive ID such as the Elaboration Theory (Reigeluth, 2013), wherein content is covered at increasing levels of depth but the purpose remains content coverage rather than deep learning. How does one build that depth in training programs throughout an organization?

To summarize, one has the opportunity to create learning experiences that have at least a three-fold purpose, each of which leads to a result that is incredibly important. It will not be simply instruction that checks boxes but will be something much more than that. The instruction will have the potential to make significant, meaningful change at multiple levels. First, *organizations* will be more effective. People will work together more efficiently and expertly, perhaps even more passionately and with more care. Individual contributors will be equipped to accomplish their objectives and to be more successful in life and work. Second, one has the opportunity to take *those targeted in the instructional design* beyond superficial skill development, no

matter how important that is, to places – as Apps revealed – of the heart. Third, there will be *personal* change for designers themselves. Immersing oneself in what will take learners and organizations to deeper places will lead designers there as well. Lasting values and principles will become at least as important for organizations, individuals, and designers as imposed deadlines or superficial box checking. As an architect of PL for human flourishing, designers should settle for nothing less than their own substantive experience, learning, and contribution.

APPLYING PL FOR HUMAN FLOURISHING IN THE CONTEXT OF INSTRUCTIONAL DESIGN

1. The key for instructional designers in terms of PL for human flourishing is developing practices for delving more deeply into the relevant aspects of human experience while also setting up instruction that can be immediately transferable and actionable.
2. Universal Design for Learning (UDL) (Rose et al., 2006; CAST, 2018) offers useful guidelines and techniques for instructional design that develop the practices and dispositions of profound learning. In particular, UDL's emphasis on developing learners who are "purposeful, motivated, resourceful, knowledgeable, strategic, and goal-directed" (CAST, 2018) supports PL for human flourishing. Instructional designers can facilitate PL for human flourishing by incorporating UDL-inspired approaches such as "disciplines of inquiry and relationship building, individual exploration, increased engagement, attention to self-direction and goal setting, personal agency, and long-term scaffolded learning" (Rogers-Shaw et al., 2022). See Table 10.1 for concrete examples of how these approaches exemplify profound learning practices following UDL guidelines. While UDL work often focuses more narrowly on special education populations and checklists of requirements for instructional settings, we encourage a broader lens.
3. Profound learning for human flourishing is operationalized through five primary processes: Identity Formation, Transformation, Deformation, Reformation, and Intentionality. Facilitating these processes is the goal of instructional design in the context of PL for human flourishing. We've developed key guiding questions for instructional designers to ask for each of these processes (See Table 10.2). In addition, drawing on Awajan (2022), we have set these profound learning questions side by side with questions for the primary processes of both ADDIE and UDL. Awajan found that combining both the ADDIE model and Universal Design for Learning (UDL) instructional design frameworks improved performance outcomes for undergraduate English students, and recommended further studies into "integrating other instructional designs in planning for English literature courses in higher education" (p. 11). We concur, and here we further extend the integration of ADDIE and UDL design with the principles and processes of PL, an emerging lifelong learning theoretical framework.

Table 10.1 shows the connections between PL and UDL and offers examples of practical applications that combine the two concepts. The first column

TABLE 10.1 Building Profound Learning Practices Through the Application of Universal Design for Learning Guidelines*

PROFOUND LEARNING PRACTICES	UNIVERSAL DESIGN FOR LEARNING GUIDELINES*	PROFOUND LEARNING APPLICATIONS OF UNIVERSAL DESIGN
Develop practices, routines, and habits.	Use charts, calendars, and schedules that increase the predictability of daily activities. Create class routines.	Model learning practices within the course.
Encourage continual exploration and promote learner agency.	Provide learners with discretion and autonomy in the level of perceived challenge, the type of rewards or recognition available, the context or content used for practicing and assessing skills, and the tools used for information gathering or production.	Ask questions and ask learners to ask questions they care about into the module.
Increase thoughtfulness, clarity, and openness through reflection.	Invite personal response, evaluation, and self-reflection to content and activities.	Consider discussion group reflection. Encourage multiple perspectives, processes, and values.
Establish community relationships in the learning environment.	Create cooperative learning groups with clear goals, roles, expectations, and responsibilities that enable communities of learners to engage in common interests or activities.	Develop safe, trusting discussion environments where learners are more likely to engage in deep and meaningful exploration and sharing.
Emphasize that there is no single truth, but rather that learning is a continual exploration and deepening of knowledge.	Emphasize process, effort, and improvement in meeting standards as alternatives to external evaluation and competition.	Develop a growth mindset culture, wherein perfect knowledge is not the goal, but rather deepening understanding.
Stress the continuous nature of learning that takes place over a lifetime.	Focus on goals of adult learners. Make connections to previously learned structures.	Include application of take-aways and reflection about future learning opportunities and anticipated needs.
Engage in meaningful reflection.	Embed prompts to “stop and think” before acting to “show and explain your work.” Embed coaches and mentors that model think-alouds of the process. Ask questions to guide self-monitoring and reflection.	Incorporate meta-cognition and critical reflection skills/ assumption-testing into course material and exercises.

(Continued)

TABLE 10.1 (Continued)

PROFOUND LEARN- ING PRACTICES	UNIVERSAL DESIGN FOR LEARNING GUIDELINES*	PROFOUND LEARNING APPLICATIONS OF UNIVERSAL DESIGN
Seek breadth and depth in learning.	Introduce graduated scaffolds that support information processing strategies. Provide multiple entry points to a lesson and optional pathways through content.	Practice taking on differing roles, perspectives, and contexts in order to develop expertise in learning-to-learn how to approach learning in more complex ways.
Continuously reevaluate previous ideas and values.	Incorporate explicit opportunities for review and practice. Embed new ideas in familiar ideas and contexts, using analogy and metaphor.	Model formative evaluation in the course, action learning/action research.

*The UDL Guidelines are drawn from CAST (2018), a nonprofit educational research organization that provides guidelines for educators and designers to use when implementing UDL. They include specific application ideas that can be incorporated in course and lesson design so that the educational content and experiences are available to all learners.

Table 10.1 Reprinted from Rogers-Shaw et al. (2022).

TABLE 10.2 Questions to Ask When Designing Through ADDIE, UDL, and PL

ADDIE ¹	UDL ²	PL ³
<i>Analyze</i>	<i>Design</i>	<i>Identity Formation</i>
What are the instructional goals and how will they fill knowledge and skill gaps?	Do the design features enhance individual choice, autonomy, relevance, value, and authenticity?	Across time, who are the learners and what do they want to accomplish and become? How do the learning activities extend beyond a single event of instruction to encompass a more holistic vision of the learner?
Who is the target audience, what do they know, what is their motivation, what is their experience, and what are the learning outcomes for this audience?	Do the design features minimize threats and distractions while supporting goals and objectives?	What are their values and how do learners recognize and represent their values in the learning process and activities?
What resources, both technological and human, are needed to present crucial information, facilitate technology use, and effectively deliver the content?	Do the design features offer challenging learning activities with multiple options to reveal mastery and increase community through collaboration?	What learning practices accentuate their senses of agency, purpose, volition, and virtue?
	Do the design features aid goal setting, planning, strategizing, managing content acquisition, and building capacity?	What design elements increase thoughtfulness, clarity, depth, breadth, and openness through meaningful reflection?

ADDIE ¹	UDL ²	PL ³
<i>Design</i>	<i>Engage</i>	<i>Transformation</i>
How are objectives and strategies aligned with instructional goals?	What options are available for learners to manage their own learning?	Given the lens of identity formation, what instructional activities highlight opportunities for change and continuous learning process across time?
How do the learning objectives define specific, measurable actions that will enable learners to fulfill instructional goals?	How will multiple forms of engagement encourage learners to maintain their motivation and continue to put effort into their learning process?	Will the instructional activities reframe taken for granted frames of reference to make them more inclusive, discriminating, open, emotionally capable, and reflective?
What specific links between course content and learning objectives are visible?	What varied learning activities will most effectively interest and engage the learners?	What learning activities encourage continual exploration and promote learner agency while establishing trusting community relationships in the learning environment?
How are content and learning activities presented in a logical sequence that supports the learners' construction of knowledge and skills?		What opportunities are available to take on differing roles, perspectives, and contexts to develop expertise to approach learning in more complex ways?
How do assessments provide feedback on how the learners' progress is meeting the defined learning objectives?		
<i>Develop</i>	<i>Represent</i>	<i>Deformation</i>
How can learning resources integrate content and strategies through various media that will provide guidance for instructors and learners?	What options are available for learners to choose how to acquire knowledge that increases their understanding?	How can learning processes and activities bring about unintended changes in perception that may be undesirable, that may alter those perceptions in a way that is perceived to have made them less than what was originally meant to be or potentially could be?
How can the design be validated and revised based on instructor and learner review?	How do the varied ways that information is delivered assist learners in comprehending symbols and expressions?	Through learning processes and activities, how can acknowledgment that decay, destruction, and associated processes which tear down, disassemble, or muddle that which was formerly clear, become a part of the ongoing cycle of regeneration that can lead to reformation?
What type of pilot test can collect instructor and learner feedback and observations to enlighten the revision process prior to full implementation?	How do available and differing ways of acquiring information help learners recognize what needs to be learned?	How will the learner come to understand that a growth mindset is necessary, wherein perfect knowledge is not the goal, but rather deepening understanding is the objective?
		How does the design illustrate that learning is a continual exploration over a lifetime that deepens knowledge without pointing to a single answer?

(Continued)

TABLE 10.2 (Continued)

ADDIE ¹	UDL ²	PL ³
<i>Implement</i>	<i>Act & Express</i>	<i>Reformation</i>
How will specific features of the learning space engage the participants?	How can learners work strategically to gain knowledge, develop skills, and reveal their growth?	How do design elements lead to reformation where learners consider changes in perception that brings them back to previous ideas or a different or better state?
What is the process for engaging participants from enrollment to pre-course communication and class interaction that will effectively use learning resources?	What multiple means of expression can learners use to show what they have learned? What activities will offer varied ways to respond to the content?	What learning activities can involve a total or lesser reconfiguration of what is known into something new, different, innovative, or creative by adding new elements to a body of knowledge or practice or subtracting elements that were a part of the prior form, resulting in different qualities and potentialities?
<i>Evaluate</i>	<i>Evaluate</i>	<i>Intentionality</i>
How will the learning environment, process, and activities be evaluated through measures of participant satisfaction, acquisition, and transfer of newly acquired knowledge and skills to real-world experiences?	How can display, auditory, and visual design features be customized? How can design features provide scaffolding in the learning process? What features are available to allow learners to communicate through languages that create a shared understanding?	How does the learner interact with the world and what are the implications for instructional activities?
How will the quality of learning resources be evaluated to determine if it satisfies the standards established in the design phase?	What features will tap into background knowledge, highlight patterns, draw attention to important information and relationships within content, improve the construction of meaning, and support learning transfer? What different tools can be used to enhance navigation, increase access, and offer response options through different modes of communication?	How do the values and meanings of the learner's positionality and identity shape the subsequent knowledge attained through a formative instructional activity? How does the learning design help learners develop practices, routines, and habits?

¹ (Branch, 2009; ²CAST, 2018; Meyer et al., 2014; ³Kroth et al., 2022)

highlights specific practices of PL. A more in-depth discussion of these ideas can be found in the literature on PL (Kroth & Carr-Chellman, 2020; Kroth et al., 2022; Rogers-Shaw et al., 2022). The entries in the second column offer some examples of guidelines created by CAST (2018); many more are available at the website (<http://udlguidelines.cast.org>). In the final column, we have suggested ways that the corresponding features of PL and UDL can be joined in design elements and teaching practices. This process can be replicated with the addition of other PL practices and UDL guidelines, providing novice designers with a model to pursue as they incorporate PL and UDL to encourage deeper learning over time.

In approaching Table 10.2 as a learning tool, it is important to recognize that no single project will highlight all the questions. By starting with one question for each step in the ADDIE process and then choosing one question across the corresponding row in both the UDL and PL columns, novice designers can begin to recognize the links between the three frameworks. The next project can then begin with different ADDIE questions and different matching UDL and PL queries so that the designer's knowledge of the combined application of elements of ADDIE, UDL, and PL increases.

REVISITING PL FOR ID PRACTICE

Chris sat, reflecting on the open pages of Apps's text. As he struggled with how to move beyond the box checking, he spied his *Trends* text and recalled the chapter on Profound Learning. Reaching up and taking the book off the shelf, he flipped to the proper table (Table 10.2) chose the ADDIE Analyze question, and asked himself, "Who is the target audience, what do they know, what is their motivation, what is their experience, and what are the learning outcomes for this audience?" Then he focused on the UDL Design question "Do the design features aid goal setting, planning, strategizing, managing content acquisition, and building capacity?" Finally he thought about the PL Identity Formation question "How will the learner come to understand that a growth mindset is necessary, wherein perfect knowledge is not the goal, but rather deepening understanding is the objective?" These choices would put the focus on the intended students and concentrate on the design features that best identify and support students in achieving their goals and flourishing through the experience of PL – Chris began to see a connection from his work to the heart work of PL.

His next step was to move to the second row, where he chose to concentrate on student learning activities. He chose the ADDIE question "How are content and learning activities presented in a logical sequence that supports the learners' construction of knowledge and skills?" In the Design row, he then picked the UDL question "What varied learning activities will most effectively interest and engage the learners?" Finally, in the Engage section, an appropriate option was the PL question "Across time, who are the learners and what do they want to accomplish and become? How do the learning activities extend beyond a single event of instruction to encompass a more holistic vision of the learner?" for transformation. Chris then developed a greater comprehension of the meaning of engaging learning activities that support human flourishing through PL.

Over the length of a course, Chris engaged this PL framework and chose the questions in a way that scaffolded the learning for his learners. Additionally,

Chris allowed the students to decide on the options that resonated with them and to proceed on a path that they found most engaging and motivating. Chris scaffolded the assignments and revised and submitted them demonstrating a strong integration of ADDIE, UDL, and PL in a more complete and fully developed form. There were still plenty of unanswered questions to inspire future learning, and the process that Chris engaged reflected PL's deep and continued learning process that leads to human flourishing.

Satisfied, Chris leaned back in his desk chair, books, materials, sample questions, goals, objectives, UDL guidance, and PL questions scattered about his desk, but his design blueprint now looked like something quite different from his earlier moment of exasperation at the sameness of his design life. Through careful application of UDL, PL, and ADDIE, he had found a way to bring new meaning to his ongoing work. Maybe he couldn't have done this with his first, or second, or even his 50th ID project, but now he felt he was at least beginning to bring more substantive meaning and depth to his ID work, and in doing so, helping to promote human flourishing.

Summary of Key Principles

1. **Profound Learning for human flourishing presents a new way of framing human learning using ancient concepts and practices.** PL processes and practices engaged across time offer continuity and direction to create opportunities for and experiences of human flourishing, an ancient concept.
2. **Human flourishing is the actualization of our purposes as human beings.** The practices and processes of PL move us closer to human flourishing by providing opportunities for our human purposes to be actualized through disciplines and practices.
3. **The human learner, human learning, and instructional practices are interpreted in the context of human flourishing.** The needs of the learners are not limited to a particular time and place. Instead the needs of the learner are interpreted through an end-in-view, longitudinal arc of experience, offering continuity and depth.
4. **Human flourishing is not an end state; it is activity.** When designing instruction for PL, human flourishing is not an objective to be accomplished once and for all. Rather, designers create opportunities for learners to experience human flourishing through the processes and practices of learning in the context of embellishing our purposes as human beings.
5. **Learning and performance problems, when viewed simply through the lens of right and wrong rather than a trajectory of formation over time, become amplified rather than improved.** PL for human flourishing is a process of improvement. If a test is the primary measure, the learning is not on the horizon of human flourishing.

Application Questions

Use Table 10.2 to help you answer the following questions:

1. The director of human resources at a mid-sized auto parts manufacturer

is concerned about the company's inability to hire and retain a diverse workforce. The majority of employees are white males, and although they find the workplace climate amenable, the director is concerned that it is not welcoming to women or people of color. Each year, all employees attend a mandatory Diversity, Equity, Inclusion, and Belonging (DEIB) workshop as part of standard professional development training. Prior to the workshop, employees anonymously complete a cultural competency survey where the scores are tabulated and compared to the previous five years to assess whether employees as a group have moved along the continuum of cultural competency. Also, after the DEIB training, the content knowledge acquisition of the training materials is assessed through a series of online quizzes that employees submit within three days of the training. In recent years, the scores from the cultural competency survey reveal that employees acknowledge the value of diversity to a limited extent, yet they do not transfer their knowledge of DEIB to their workplace practices. The director believes there is a need to redesign the workshop and DEIB assessment tools in order to create a more welcoming environment where diverse workers can flourish.

- a. What would you do as an instructional designer to address this training to produce deep, Profound Learning experiences that will increase human flourishing in the workplace?
 - b. What steps would you include in your design that would produce deep, Profound Learning experiences that will increase human flourishing?
2. The Education Department chair at a large public university has been charged with creating an online

certificate program in leadership that, if successful, will become the basis for a full master's program. The objective is to recruit a wide range of diverse students from a variety of fields who will start their academic journey by earning the certificate but then continue on to matriculate and pursue a graduate degree. A faculty committee has researched similar programs, determined the pool of prospective students who might be interested in such a certificate program, and designed the general parameters of the program requirements and curriculum. They have agreed that to attract working professionals and create a pathway to success for the students, the courses need to capitalize on initial student motivation to advance in the workplace through acquiring an additional credential, recognize that family and job responsibilities may result in barriers to success, and offer alternate means of gaining knowledge, demonstrating understanding, and applying academic content to real-world settings.

- a. What would you do as an instructional designer to address the development of the framework and courses for achieving the certificate in a way that produces deep, profound learning experiences that will increase human flourishing online and spur profound learning through matriculation at the university graduate school?
- b. What design elements would you include to identify student objectives, develop student recognition of the value of the course content to their career path and lead to high levels of engagement, and provide support and feedback that would assist students in achieving their goals and flourishing through Profound Learning?

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Systems Influence on Instructional Design and Technology

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Instructional design and technology (IDT) formed from an integration of concepts from a variety of fields such as education, psychology, communication, and systems. This chapter describes the contributions of systems, as well as future opportunities based on recent developments.

BRIEF HISTORY OF GENERAL SYSTEMS THEORY AND INSTRUCTIONAL DESIGN AND TECHNOLOGY

Systems theories that were developed in the 1950s and 1960s suggested that systems share universal organizing principles and concepts. Perhaps the clearest example is general systems theory (GST), developed by Ludwig von Bertalanffy. In essence, Bertalanffy proposed a new paradigm for conducting inquiry through a general theory that could explain, understand, and bring together all fields of study. Systems in this paradigm involved shared conceptions such as feedback, control, stability, goals, input/output, and homeostasis (1956). Systems problems were complex, dynamic (changed over time), and comprised a large number of variables, which were interconnected and interdependent. Systems were composed of parts and relationships between these parts and due to the behavior of these relationships, the whole/system was more than just a sum of its parts – it had properties not possessed by the parts themselves.

GST then became an interdisciplinary theory that could describe and explain the characteristics and behavior of any system (simple or complex) through its set of terminology, facts, concepts, and constructs. The ability to examine problems from this perspective allowed for better understanding and decision making, leading to higher impact solutions. Many disciplines (engineering, counseling, legal, military, cybernetics, social work) including

IDT began to use this framework as an organizing principle for development, study, and inquiry within their own fields of study.

Systems thinking – the application of systems theory – thus became a holistic approach to analyzing a problem or phenomenon by focusing on how the component parts of a system were interconnected and interrelated and worked within the context of other systems that exchanged energy and information over time. Any “open” system exchanges energy, matter, and information with its environment. These exchanges in turn transform various elements of the system itself.

Many other concepts related to systems theory and systems thinking have been developed. Some examples are defined here:

- **Self-regulation** allows the system to keep itself balanced (within the limits of its structure) through the exchange of information as an adaptive mechanism
- **Autopoiesis** aligns the system’s internal complexity with the complexity of the outside environment through its own self-organizing feature (Maturana & Varela, 1975)
- **Homeostasis** allows the system to (maintain) a state of equilibrium over time through exchanges of energy and information between the system and its external environment (Hannan & Freeman, 1977)
- **Common finality** is the interaction of a set of parts within the system to reach a final goal that is necessary for the system’s survival (von Bertalanffy, 1962)
- **Equifinality** is reaching the same end state even though starting from different conditions and perhaps taking different paths to get there in an open system (Katz & Kahn, 1978)

The IDT field did not adopt all such concepts. The history of IDT, which we explore more later, has been primarily focused on *systematic* rather than *systemic* (Carr, 1996) approaches. In IDT, taking a systems approach meant mostly thinking holistically about the many elements that influence learning and searching for patterns of interdependence among them. As a good example, the field was successful in developing a systems approach to training, which was subsequently broadened to human performance improvement (HPI), in which various options for solving performance problems included training but also incentives, job aids, and benefits. In IDT and HPI, patterns were found through rationalistic scientific research, for example, methods were found to be effective and efficient in achieving desired learning outcomes in certain settings (e.g., Gagné’s, 1985 *Nine Events of Instruction*), and principles of message design (Fleming & Levie, 1978) were articulated. Also, a set of analytic, synthetic, and evaluative processes, ultimately called instructional systems design, was developed to define and apply patterns in specific contexts (i.e., identify needs, learners, and tasks; articulate objectives; design instructional strategies and tactics; test and improve).

One context where the adoption of some systems concepts can be seen is the evolution of learning theories, from behaviorism to cognitivism to constructivism (see Table 11.1). We will use this context to offer specific examples.

Behaviorism

The impact of behavioral psychology placed significance on the external environment and observable behaviors, which led to ID processes such as task

analysis, measurable objectives, and direct instructional (lecture) approaches. Measurable objectives were used in order to evaluate the effectiveness (and sometimes efficiency) of instruction and ultimately the return on investments in instructional programs. The use of instructional objectives advanced during the 1950s when instructional design was still a relatively young field. During this time, “the primary responsibility of instructional experts became to specify objectives and identify and sequence the contingencies to enable learning to occur” (Kang, 2004, p. 39). At this time, technology in instruction such as teaching machines and programmed instruction delivered sequenced content.

In the instructional design world, people such as Finn, Banathy, Briggs, and Gagné sought to integrate the systems framework into their work. Banathy (1968), for example, proposed that systems theory could be used to better educational organizations through the use of objectives, criterion tests, and a consequent designed process, program, service, or event that would allow the needed changes to take place. He viewed education systems as places that were interactive and dynamic, always changing to meet the needs of the learner. Such a system served as a place where the teacher was a resource in a cooperative environment and the student was not just a passive recipient of teacher lectures but an active explorer in the quest for knowledge (Banathy, 1968).

The use of a systems approach was important because it helped to establish instructional design as a *discipline* in its own right, and instructional design became instructional systems design or instructional systems technology at several universities. As a clear example, learning as a behaviorist construct was thought to occur when the desired observable behavior was consistently reinforced via either positive or negative “feedback” (a systems concept). The general systems concept of “self-regulation” was also integrated into the design process during this time through the steps of both formative and summative evaluation. The information provided from these forms of evaluation was used as input to continually improve the instruction.

Cognitivism

During the 1970s instructional design theories and models began shifting to focus on internal processes due to the evolution of cognitive psychology. An information-processing model was proposed, which suggested that specific internal mental events occur when learners are presented with different types of stimuli. Emphasis of this information-processing model called for the arrangement of instructional events in a specific manner in order to achieve the sought-after outcomes. The main responsibility of instructional designers during this time, then, was to select the appropriate *conditions* for learning to occur (Gagné, 1985). Gagné proposed that both internal conditions (what the learner knows prior to instruction) and external conditions (stimuli in the form of what instructions are provided by a teacher), work together to produce a specified outcome. This model was both systematic, through his “nine events of instruction,” and systemic, in the sense of higher orders of learning in the system being dependent upon mastering the lower levels of learning. Under the cognitive model, instructional designers examined interconnections and interactions between various components and identified the conditions that influenced learning. The learning system, then, was characterized as a process of information being transmitted through the

senses, registered in short-term memory, and transformed through semantic encoding to a form that entered long-term memory. The information became meaningful (and later applicable) as it was related to existing information within the learner's schema.

IDT also recognized that learning occurred in the context of a teaching-learning system that could be composed of several different levels (student, classroom, organization, and community). All components of this system were suggested to be seeking an equilibrium between effective instructional design and teaching practices (Biggs, 1993).

Also, during this time, within cognitivism, a cognitive load theory was proposed suggesting that there is limited cognitive capacity with respect to working memory and instructional systems should be designed in such a way as to avoid cognitive overload while at the same time optimizing the use of working memory (de Jong, 2010). If memory is a system made up of different subsystems (working memory, short-term memory, and long-term memory), then this becomes important when designing instruction. Cognitive load theory suggests that learning is hindered when working memory is surpassed during the learning task.

Constructivism

In the 1990s constructivism became a dominant influence in education and instructional systems design (e.g., Duffy & Jonassen, 1992). The uniqueness of each learner became important as we shifted from teacher as lecturer to learners constructing their own knowledge. Teachers in this framework served more as facilitators in the teaching/learning process. You may have heard the phrase "guide on the side" instead of "sage on the stage." Learners in this framework, do not passively receive information; they actively process information and construct their own meaning from the information they receive. Mechanisms such as reflection, scaffolding, motivation, and active and social learning (Newby et al., 1996) are all central to the use of constructivism frameworks by instructional designers.

In constructivist thinking, knowledge is constructed by connecting new information to preexisting knowledge in a learner's own personal schema. Learning is a social activity and an active process. Learning is viewed as contextual and situational, and reflecting upon the learning experience aids in the classification of the new information.

This constructivist-proposed shift in thinking about the ways in which learners learn necessitated new methods for teaching such as cooperative learning, group investigation, role playing, inquiry-based learning, and problem-based learning. The use of authentic tasks for problem solving and product development became an important tool, and instructional designers needed to use methods and tactics that allow the learner to activate prior knowledge, encourage self-reflection, and provide the right amount of challenge in an instructional task in order to nudge students toward organizing new solutions and integrating these new solutions into their schemas. Use of the systems concept of "feedback" went beyond corrective "right"/"wrong" assessment. Rather, feedback was used to challenge a learner's knowledge and to foster growth through connecting performance and behavior relative to the learning goals and outcomes.

TABLE 11.1 Systems Concepts Applied in Learning Theories

BEHAVIORISM	COGNITIVISM	CONSTRUCTIVISM
Systems Concepts: (Simplicity) • Formulation of objectives in order to reach common goals via group contributions • View that places of education were dynamic systems that changed to meet learner needs	Systems Concepts: (Simplicity Heading Toward Complexity) • Higher levels of learning are dependent upon mastering lower levels of learning • Interconnections and dependencies from parts of the learning system (learners, teachers, conditions of learning, and outside environment all contribute to learning that is greater than the sum of its parts) • Memory itself is made up of different subsystems that instructional designers need to take into account when designing and using instructional tools, tactics, and methods	Systems Concepts: (Complexity) • Feedback challenges a learner's knowledge and goes beyond "corrective" feedback in order to foster growth • Self-reflection becomes an important tool in the instructional designer's toolkit, leading toward a greater understanding for the learner's newly acquired and integrated knowledge

FROM SIMPLICITY TO COMPLEXITY

As the previous examples illustrate with respect to learning theories, IDT has adopted some concepts from systems theory and has attempted to do so beyond the context of training and performance improvement. What may not be fully appreciated, though, are distinctions between system types and the nature and characteristics of simple and complex systems (Gell-Mann, 1994).

Since the 1970s, the systems community has distinguished system types, for example, natural systems, designed-physical systems, design-abstract systems, and human activity systems (Checkland, 1981). The types have different characteristics and can be effectively influenced by different means. We will use two types to illustrate.

A *designed physical system*, like a bicycle, is thought to be simple. It has relatively few parts and clear relationships among them. Those relationships are predictable, linear (outputs are proportional to inputs), and externally ordered. For example, we can say with certainty that pedaling causes the bicycle wheel to turn in proportions determined by the bicycle gears. A simple system is usually effectively influenced by a systematic process, for example, a step-by-step process to assemble the bicycle or troubleshoot a problem with it, and decision making within that process can be evaluated as right or wrong.

A *human activity system*, like a high-performing sports team, on the other hand, is thought to be complex. It has many parts that are well integrated (as opposed to a complicated system that has many parts that are not well integrated; Csikszentmihalyi, 1993). The behavior emerging from that integration is unpredictable and nonlinear, and results from self-organization. For example, the sports team's performance relies on a large quantity and high quality of players' interactions in the moment. The output of such a system is often dis-proportional to the inputs (in a positive sense for the winning team), and it can be influenced or guided indirectly through systemic thinking. For example, improvements can be made by a skillful coach who appreciates the whole and is sensitive to circumstances, and by the team members themselves through constant communication. The wisdom of judgments can be appreciated only in retrospect from their consequences.

These distinctions between designed physical and human activity systems, and between simple and complex can have significant impact. In fact, treating one type as another can cause harm. For example, treating a bicycle (simple system) as complex can waste time and resources. And applying a systematic process to a sports team during competition is more likely to diminish, rather than improve, its performance. The latter is actually what happened in the 1970s as "systems engineers" attempted to apply systematic processes developed in the 1950s and 1960s for designed physical systems to human activity systems (under such banners as Operations Research and Efficiency). The results were harmful rather than helpful and led the systems field to recognize the importance of system types and to develop different means to influence human activity systems (e.g., soft systems methodology, Checkland & Scholes, 1990).

Returning now to IDT, we assert that the field has effectively incorporated some systems concepts and principles from GST and other systems theories, but primarily those associated with simplicity. This can be seen in both process and product. In process, the field has continued to foreground systematic models in pedagogy and practice, even though studies of designer expertise (e.g., Perez et al., 1995; Rowland & Adams, 1999) suggest otherwise. These are often sequences of activities said to ensure effective and efficient instruction, a product from which error has been "tested out" through evaluation. Both the process and product are thus based on assumptions of predictability (making prescriptive principles possible) and linearity (known, proportional outcomes) – assumptions that the systems field has suggested are best only for simple, designed physical systems.

We assert that IDT has not sufficiently appreciated the differing nature of complexity and adopted or developed methods appropriate to complex human activity systems. Rather, like other fields going back to the 1970s, it has attempted to extend the logic of simple systems, for example, to "engineer" outcomes in contexts that make such an approach ineffective. To be direct, it is no accident that instructional design has worked well for training and low-level learning goals, and not so well for the broad goals of education. And the resistance to constructivism within the field may have actually been resistance to assumptions of complexity. The field of IDT could make broader contributions if the complexity of human learning were more fully recognized and if related developments in the systems field were adapted and applied.

There are three opportunities that we think this yields:

1. We can develop methods that are a better match to complexity. The emerging field of systemic design offers much guidance in this, complementing the prescriptive science that guides us with simplicity (see, e.g., Sevaldson, 2022, Rowland & Kitchner-Meyer, 2018). Concepts like evolutionary guidance (Banathy, 2000) and evolutionary learning communities (Laszlo & Laszlo, 2004), and tools like Gigamapping (Sevaldson, 2011), could be adapted for IDT. Work to embrace complexity in the human performance field could inform this effort also (Wittkuhn, 2006; Rowland, 2007).

A positive example of where assumptions of complexity appear to have been embraced is user design of learning environments. Carr-Chellman (2006) suggests that learners have both a right and a responsibility to design their own system of learning. This differs from traditional instructional design where stakeholders may have been invited to participate at only the initial needs assessment step in the design process. User-design extends the involvement of the stakeholder to all phases of the design process where the end users have both design and decision-making powers at all levels of the project. The emphasis, according to Carr-Chellman, is on *empowering* the users/learners instead of privileging designers or even suggesting that all stakeholders have equal power in the design process (2006). She suggests that this approach is derived from systems concepts and theories and may even “foster inclusion in our design products and processes, countering racism and promoting social justice” (p. 655). It is important to recognize here that the approach is not just altruistic, though. It is based on the assumption that learning is complex (unpredictable, non-linear) and that it is the learner who is most sensitive to the initial and ongoing dynamic conditions, who plays a key role in the system’s organization (not just as a recipient), and who can make the greatest contribution to the system’s adaptation to change. These harken back to the features of GST and point toward what IDT left behind. It is also worth noting here that the recent shift to online learning during the COVID pandemic did little to shift perspectives toward complexity; rather, it likely reinforced the mindset of simplicity. Notice the associated language of “learning management systems” that were given increased attention.

2. We can develop a situational approach to match methods to different contexts and system type (e.g., simple, complicated, complex). A key challenge would be developing the sensing mechanisms to appreciate the nature of the situation and make a judgment of appropriate approach. Snowden and Boone (2007) offer a tool for organizational development that could serve as a starting point.

Further, such links between learning and systems types and theories (e.g., constructivism and complexity) could be exploited in ways that get past resistance. For example, we asserted earlier that resistance to constructivist design may have been an unconscious resistance to assumptions of complexity. If so, then the systems side might afford a helpful shift of focus. Rather than focusing on the idea that learners construct knowledge for themselves (which causes problems in what exactly

should be taught), constructivist design could focus more on the concept that learning is situational for individuals due to the various systems (microsystem, mesosystem, exosystem, macrosystem, and chronosystem) that make up their lives (Bronfenbrenner, 2005). For example, if we understand learners' systems as including their family, friends, classmates, teachers, and their own lives, we can account for all these interactions and levels of systems as we design for the learner.

3. We can broaden our scholarly inquiry from an emphasis on methods and a search for prescriptive principles that apply generally (e.g., methods prescribed for certain conditions and desired outcomes) to the creation of a body of precedent material like that used by designers in other fields such as graphic design and architecture. The latter has begun with the *International Journal of Designs for Learning* (IJDL) and involves design cases, rich descriptions of unique design processes and artifacts. The implication here is a different, expanded view of design, one not restricted to analytic prescriptive science but open to design as an equally legitimate creative, synthetic way of knowing and acting (Nelson & Stolterman, 2014).

The simple/complex distinction is again relevant here and relates closely to differences between rationalistic and naturalistic inquiry (Lincoln & Guba, 1985). Traditional IDT research, in a rationalistic paradigm, focuses on "truth value" and seeks governing laws and prescriptive principles, evaluated with such criteria as internal validity, objectivity, reliability, and external validity/generalizability. In contrast, the development of design cases, aligned with a naturalistic paradigm, focuses on "trustworthiness" and evaluation with such criteria as credibility, dependability, confirmability, and transferability (Smith, 2010). The latter is more consistent with complexity, and with design processes that focus on the unique interactions, interconnections, and interdependencies of individual cases.

4. We can broaden the way in which we train future instructional designers. The simple/complex distinction also implies different approaches to design education. Where assumptions of simplicity are made, training in process steps is reasonable, and a systematic approach will likely work well. If we think about instructional design as both a science and as an intellectual tradition that shares characteristics with other design fields (graphic, product, web, exhibit), this can extend our ways of teaching to include "designerly ways of knowing" (Cross, 2006), through studio courses, design activities, and cases (Boling & Smith, 2010). Where assumptions of complexity are made, mentored case experiences in a studio environment would be more useful (Boling et al., 2016). We should clarify that simple/complex does not mean easy/difficult. Rather it refers to what we judge to be the nature of the situation, and thus the means to influence it positively. Such design cases and studio experiences currently exist; we have an opportunity to build on them.

Throughout much of this chapter, we have adopted an either/or perspective, and this can be seen in Table 11.2, which summarizes many of the distinctions we have made. It is possible to think of simple/complex as a continuum and to treat systems, situations, and inquiry as landing somewhere along it.

TABLE 11.2 Simplicity and Complexity Compared

	Simplicity	Complexity
Characteristics	predictable, deterministic, linear, externally ordered	unpredictable, adaptive, nonlinear, self-organized
System type	designed physical	human activity
Learning theory: examples of systems application	behaviorism and cognitivism: hierarchies of objectives, learning systems, memory systems	constructivism: self- reflection, second-order cybernetic feedback
Design process	ID as prescriptive science	systemic design
Design product/artifact	instruction (e.g., programmed instruction)	learning environments
Design education	training in process steps	studio – mentored case experiences
Inquiry methods & criteria	rationalistic (e.g., experiments, correlation studies, surveys): internal validity, reliability, objectivity, generalizability/external validity	naturalistic (e.g., participant observation, interview, ethnography, design cases): trustworthiness, credibility, dependability, confirmability, transferability
Ontology (underlying assumptions)	material, objective reality independent of our understanding; reality obeys or is a complex interaction of natural laws; laws may be discovered and used to describe, explain, and/or predict	subjective reality dependent on our understanding; meaning socially constructed and embedded in context; behavior is not random or capricious but is not necessarily consistent within or across contexts
Approach	search for natural laws by studying relationships (e.g., causes and effects), deduce, hypothesize, isolate things that may be related, control other factors, measure covariation, express observations as quantities, use methods of mathematical analysis, draw conclusions	understand holistically, induce, allow “conclusions” to emerge, interpret meanings, triangulate, express in narrative form

In summary, systems theories and concepts have been applied throughout the evolution of the field of instructional design and technology. As the field evolves, so does our thinking. The movement toward designing through the lens of complex systems allows for new ways of thinking, understanding, knowing, and teaching to take place in the design and development of learning environments as well as inquiry in the field.

Summary of Key Principles

1. **Instructional design and technology was influenced (along with other disciplines) by the systems theories of the 1950s and 1960s.** The influence of these systems theories can be seen in instructional design methods related to the evolution of psychological learning theories from behaviorism to cognitivism to constructivism.
2. **The IDT field has effectively incorporated some systems concepts and principles from GST and other systems theories, but primarily those associated with simplicity.** This can be seen in both process and product.
3. **IDT has not sufficiently appreciated the differing nature of complexity and adopted or developed**

methods appropriate to complex human activity systems. This lack of appreciation has raised opportunities for the IDT community in four areas: (1) developing methods that are a better match to complexity; (2) developing a situational approach to match methods to system type; (3) broadening our scholarly inquiry from an emphasis on methods and a search for prescriptive principles that apply generally (e.g., methods prescribed for certain conditions and desired outcomes) to the creation of a body of precedent material like that used by designers in other fields; and (4) broadening the way in which we train future instructional designers.

Application Questions

1. For each of the three learning/instructional theories (behaviorism, cognitivism, and constructivism) describe a learning activity that used systems concepts and provide a rationale as to why they worked (or didn't work).
2. Provide a personal example where a learning experience was treated as a simple physical system and describe what was helpful to your learning experience and what was not helpful.
3. Reflect on your own course experiences in your instructional design program. Explain how different approaches (e.g., didactic instruction, design cases, and studio courses) may have benefited and/or challenged your learning experiences.

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Social Emotional Learning

Treavor Bogard and Rochonda Nenonene

Coined the “missing piece” in education, the concept of social emotional learning (SEL) was developed in 1997 by the Collaborative for Academic, Social and Emotional Learning widely known as CASEL. As defined by the organization,

SEL is the process through which all young people and adults acquire and apply the knowledge, skills, and attitudes to develop healthy identities, manage emotions and achieve personal and collective goals, feel and show empathy for others, establish and maintain supportive relationships, and make responsible and caring decisions.

(Fundamentals of SEL, 2023, para. 1)

Based on this premise, CASEL developed a framework that was intentionally designed to be flexible and adaptive to meet the needs and context of educational, community and professional settings. Presented as the CASEL Wheel (see Figure 12.1), the framework comprises five core social emotional competencies that support learning and development growth. These five competencies are: self-awareness, self-management, social awareness, relationship skills and responsible decision-making (Bridgeland et al., 2013, p. 4).

To provide greater clarity in terms of the aim of competency, a brief definition of each is presented:

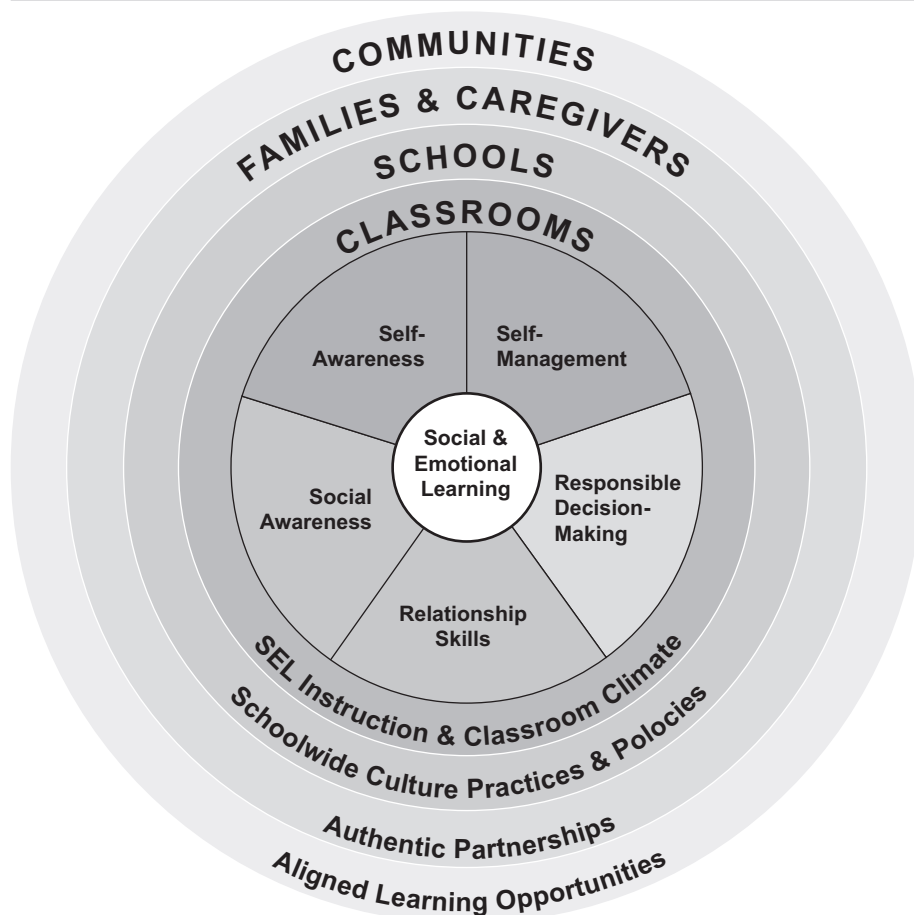
1. **Self-Awareness:** The ability to accurately recognize one’s emotions and thoughts and their influence on behavior. This includes accurately assessing one’s strengths and limitations, and possessing a well-grounded sense of confidence and optimism.
2. **Self-Management:** The ability to regulate one’s emotions, thoughts, and behaviors effectively in different situations. This includes managing stress, controlling impulses, motivating oneself, and setting and working toward achieving personal and academic goals.
3. **Social Awareness:** The ability to take the perspective of and empathize with others from diverse backgrounds and cultures, to understand social and ethical norms for behavior, and to recognize family, school, and community resources and supports.

4. **Relationship Skills:** The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. This includes communicating clearly, listening actively, cooperating, resisting inappropriate social pressure, negotiating conflict constructively, and seeking and offering help when needed.
5. **Responsible Decision-Making:** The ability to make constructive and respectful choices about personal behavior and social interactions based on consideration of ethical standards, safety concerns, and social norms, the realistic evaluation of various actions, and the well-being of self and others.

(Schonert-Reichl et al., 2017, p. 6)

It is widely recognized that CASEL's model is the most influential SEL framework (Greenberg, 2023), and when taught and utilized with fidelity, these competencies serve as a foundational core that enables the development of a healthy mindset, sustained academic growth and dispositions grounded in equitable epistemologies. The CASEL model is expansive, with concentric circles from the inner core representing a broadening social context that together reinforce SEL

FIGURE 12.1 CASEL SEL framework



programming. These contexts include classrooms, schools, families and caregivers, and communities. In this chapter, we acknowledge the multiple contexts that factor into SEL, but we focus specifically on the classroom context. This is to say, we focus on the instructional and classroom climate that instructional designers may consider when embedding SEL in face-to-face or online contexts.

BENEFITS OF SEL

Each core competency at the center of the SEL framework consists of knowledge, skills and dispositions that research over the past 20 years provides significant evidence of benefits associated with the implementation of SEL in schools. These benefits include:

- Positive emotional well-being, prosocial behaviors and positive relationships with others (Blewitt et al., 2018; Durlak et al., 2015; Greenberg, 2023; Mertens et al., 2022)
- Reduced classroom behavioral disruptions and mental distress (Durlak et al., 2015; Sklad et al., 2012; Murano et al., 2020)
- Increased student engagement leading to improved cognitive and academic performance (Corcoran et al., 2018; Greenberg, 2023)

Additionally, the meta-analysis of Durlak et al. (2015) and Sklad et al. (2012) found sustained long-term positive effects associated with implementing SEL.

INCREASED EMPHASIS ON SEL IN DISCIPLINES

The strength of the CASEL model rests in the ability to incorporate the core competencies within existing disciplines, frameworks and structures. This adaptability has led to the model being transformed and utilized in a variety of professions well outside of the field of education, including nursing (Kim & Shin, 2021), engineering (GE Foundation, 2023) and business (DeSmet, 2023). In 2021, the global social and emotional learning (SEL) market was valued at USD 2.13 billion and is forecasted to grow to USD 13.61 billion by the year 2030 (Polaris Market Research, 2022). SEL's continued growth in industry and professional spheres results from the recognition that the dispositions and skills developed, commonly referred to as "soft skills" are critical to the future of work, more than any other trends identified as innovations influencing the nature of workplaces (LinkedIn Talent Solutions, 2019). Yoder et al. (2020), in a review of workforce need surveys, identified that "employers continually mentioned multiple social and emotional skills, with the most referenced skills being communication and interpersonal skills, self-management skills, the ability to collaborate or work in teams, problem-solving skills, and integrity or the ability to make ethical decisions" (p. 5). SEL skills are, "view[ed] as the future backbone of America's workforce" (Yoder et al., 2020, p. 5). Professionals must draw upon SEL competencies to manage problem complexity and learn deeply in a variety of domains.

SEL AND INSTRUCTIONAL DESIGN

Of primary importance for this chapter is the identification of the nexus between instructional design and SEL. This intersection occurs when considering the

structure of implementation and the consistency in which SEL is modeled and utilized within classrooms and school-wide. Research drawn on by the science of learning shows that “cognitive skills . . . interact with emotional skills such as emotion recognition, empathy, and emotion regulation, and with social skills including cooperation, helping, and communication” (Darling-Hammond et al., 2020, p. 125).

Designing *for* SEL gives focus on integrating the cognitive, inter-personal (social), and intra-personal (emotional) dimensions of learning during instruction (National Research Council, 2012). *Cognitive* competencies include reasoning, memory, analysis, and decision-making, and are associated with skill in critical thinking, interpretation, and non-routine problem solving. *Intra-personal* competencies include self-regulation of activities and emotions during learning tasks. Other attributes include intellectual openness, adaptability, metacognition, and appreciating multiple perspectives. *Inter-personal* competencies entail social dimensions of learning such as teamwork, communication, collaboration, responsibility, and conflict resolution. A competencies perspective foregrounds SEL skills that students can develop through systematic instructional design processes. With knowledge of these competencies, instructional designers can better scaffold the cognitive, social, and emotional demands of learning deeply.

When examining these elements, it is clear that the inclusion of instructional design elements strengthens SEL programming. Schonert-Reichl et al. (2017) call for the development of “a systemic approach – one that takes into account the multiple levels of influence (e.g., policy, colleges of education, school districts, classrooms)” (p. 62). In this respect, instructional design can help ensure that SEL programming is well developed in terms of considerations of the classroom or school environment and promotes the utilization of SEL with fidelity. Traditional ID models structured under the ADDIE framework provide an opportunity to develop programming and protocols in a manner that aligns with SEL’s nonlinear approach in the implementation of standards and competencies that best fits the needs of the students being supported. As detailed in Table 12.1, this alignment of frameworks is best seen

TABLE 12.1 Comparison of the Characteristics of Instructional Design to the CASEL SEL Framework

ID Characteristics	SEL Design Element	CASEL SEL Competencies
• ID is goal oriented	• Intentional SEL integration	• Responsible decision-making
• ID is student centered	• Engaging and relevant instructional materials	• Relationship skills
• ID assumes outcomes can be measured in a reliable and valid way	• Active learning and collaboration	• Social awareness
• ID is empirical, iterative, self-correcting and is typically a team effort	• Reflection and self-assessment	• Self-awareness
	• Supportive and responsive learning environment	• Self-management

when comparing the characteristics of instructional design (Branch & Merrill, 2012) to design elements that align to core competencies of the CASEL model (Bridgeland et al., 2013).

By comparing ID and SEL, recognition of a clear alignment is evident and lends itself to understanding why SEL approaches or models would benefit from the intentionality and systems approach of the instructional design process in the development of programming and instruction.

DESIGN ELEMENTS FOR EMBEDDING SEL THROUGH INSTRUCTIONAL DESIGN

Because SEL supports deeper learning and skills needed for life and work, it is important that instructional design incorporates SEL to meet the needs of educational and industry needs. We offer the following five design elements as a means of aligning SEL and instructional design:

1. Intentional SEL integration
2. Engaging and relevant instructional materials
3. Active learning and collaboration
4. Reflection and self-assessment
5. Supportive and responsive learning environment

These five design elements may be viewed as signature practices (CASEL, 2019) which enable the holistic consideration of SEL components, thereby promoting a full consideration as to how instructional design can assist in implementing SEL programming with fidelity. In the following sections, we provide a description of each design element that adopts principles from both SEL and instructional design.

Intentional SEL Integration

As part of the analysis phase of instructional design, it is important to be intentional about what SEL competencies will be incorporated and reinforced in a manner that supports the intended content learning outcomes. Developing models and programs for SEL, as with all educational designs, should begin with considerations of the target audience as well as the content that is intended to be delivered. Many of the popular SEL programs are marketed to be utilized with primary grades (prekindergarten to grade 5), which currently leaves a gap in terms of programming designed to meet the developmental needs and considerations for middle, high school and adult learners. Understanding this need in terms of program availability, it is important to consider what development stage and grade level for which you will design. This design decision impacts the selection of content and learning objectives that will be presented to the target audience. Cantor and Gomperts (2020) highlight how critical it is to have instructional design elements linked to the science of learning and development, as these practices transform educational curriculum and professional practices, which lead to positive emotional growth and academic outcomes for students. As such, the intentional SEL integration should include an alignment with academic content and the creation of specific and clear student learning objectives (SLO).

SEL should not be considered a stand-alone concept. It is not something that is done on Tuesdays at 10 a.m. with no connection to the teaching and learning process that is happening throughout the school day. In point of fact, SEL concepts are most impactful when fully integrated into the curriculum and school-wide programming (Oberle & Schonert-Reichl, 2017; Zins et al., 2007). Kendziora and Yoder (2016) remind us that “Students are more likely to become frustrated given more rigorous academic content, so they need to learn how to recognize what frustrates them and regulate that frustration to persevere” (p. 5). Therefore, the connections between math, science, language arts, history, art, music and physical education should be explicit in terms of scope and sequence. When SEL competencies are integrated with content-specific learning objectives and tasks, for example group work in math (social awareness and relationship skills), problem solving in science (self-management and responsible decision-making); perspective taking in history (self-awareness and social awareness) and character analysis in English (social awareness and relationship skills). This type of SEL/content integration enables students to learn, apply, process and reflect in terms of their academic performance, as well as on their development of the SEL core competencies.

In summary, during the analysis phase, instructional designers intentionally integrate SEL when they:

- Identify the target audience for the course design
- Conduct needs analysis to determine the developmental level of students and SEL needs
- Based on the needs analysis, determine which SEL competencies to embed
- Determine which learning outcomes will simultaneously provide evidence of content mastery and SEL skills development

Engaging and Relevant Instructional Materials

As part of the design phase of instructional design, it is important to incorporate engaging and relevant instructional materials that reinforce the SEL competencies and intended content learning outcomes. Continuing with the goal of designing with the target audience (students) in mind, the selection of materials that elicit sustained engagement while enhancing the educational experience are necessary elements in SEL instructional design (Jones et al., 2021). Additionally, Shriver and Weissberg (2020) remind us that SEL content should be inclusive, and grounded in frameworks that promote equity, as we recognize that students bring with them to school unique identities, strengths, values, lived experiences and cultures that must be appreciated and valued. Therefore, it is appropriate to develop materials that respond and attend to these varied identities and not assume that a one-size-fits-all approach will work in today’s schools.

Engaging and relevant materials must meet several criteria: align with the state academic content standards, align with SEL core competencies, be developmentally appropriate and be relevant in terms of context and cultural sensitivity (Gagnier et al., 2022). In essence, the content “should effectively support the well-being of all students by allowing them to reflect, affirm, and sustain their cultural identities in the classroom” (Gagnier et al., 2022, p. 7).

This design element may be challenging to develop, as it relies on identifying materials, activities and resources that meet the interest levels of a rapidly changing student population. As current trends and generational conceptions of what is meaningful and engaging are subjective, the selection of content requires a balanced mix of historical understanding in terms of what is developmentally appropriate and necessary for foundational learning in the content areas, as well as insight into current student interests, which includes a bit of speculation in terms of what will hold interests while having practical applications. Finally, consideration as to how technology can be integrated into the lesson to promote engagement and facilitate differentiation of instruction and assessment should be factored into the creation or selection of materials (Luo et al., 2016).

When selecting engaging and relevant materials as part of the design phase of the ADDIE process, it is important that instructional designers attend to the following:

- Select materials that reinforce content learning objectives
- Ensure that content learning objectives align with one or more SEL competency
- Select content learning materials that are culturally relevant and developmentally appropriate
- Provide multiple modalities for content delivery; use varied media to explain the same concepts
- Embed information processing supports that build comprehension and that reduce cognitive load
- Build supports for learners to regulate their attention and time on a task
- Provide opportunities for learners to discuss/build an understanding of the content with peers and the instructor

Active Learning and Collaboration

During the development phase, a common goal is to create meaningful active learning experiences that align with the intended instructional outcomes and is informed by a constructivist view of learning. This view assumes that learners construct knowledge based on their interactions with others, their experiences, resources, and other affordances of the environment (Jonassen & Rohrer-Murphy, 1999). From a constructivist perspective, inter-personal competencies are a means through which knowledge is constructed and applied. In other words, it isn't strictly the internalization of content knowledge that leads to deeper learning, but one's engaging social practices involved in constructing and applying that knowledge in varied situations. Deep learning is actualized in social practices made up of language and relationships formed through meaningful work (Bogard et al., 2018). Therefore, it is important to select instructional approaches that foster development of the inter-personal SEL competencies, such as social awareness and relationship skills.

Inquiry-based instructional approaches such as case studies, problem-based learning, simulations, and projects-based learning are well-established methods for anchoring instruction in real-life scenarios. These approaches to instruction, which are organized around a theme, project, question or problem, combine content learning and collaborative inquiry. These methods

introduce shifting variables that impact the problem complexity and increase the social-emotional and cognitive demands required for solving the problem. These inquiry-based approaches that are facilitative of deep learning not only require rigorous use of one's cognition but also taking up the ways of interacting, talking and relating that are intertwined with identity and situated knowing (Bogard et al., 2018, p. 3).

Attending to SEL for supporting these inquiry-driven approaches requires incorporating tools for students to engage in peer-to-peer discussions and collaborative problem solving. It is important for designers to provide support for SEL skills such as teamwork, perspective taking, active listening, cooperation, and conflict resolution. Designers may include, for example, reflective prompts and tools that scaffold students in "discussing their emerging thinking, hearing others' ideas, developing concepts, language, and further questions in the process" (Darling-Hammond & Cook Harvey, 2018, p. 29). Prompts and cognitive coaching encourage students to elaborate, question, and self-explain as they work on a problem. The tools embedded in the design of the course should help students to make thinking visible, guide group processes and participation. In a sense, this is helping students to make their internal representations external and use external representations to internalize their understandings. In the process, students build robust mental models of the problem that are laden with the SEL knowledge and skills that support their interactions, orientations and skills application in the problem space.

Since social interaction is key to learning, designing for SEL requires scaffolding discourse norms that develop students' skills in questioning, explaining and elaborating their thoughts and co-construction of solutions. Fostering active learning and collaboration creates an environment for applying social-emotional skills that are needed for constructing knowledge and deeper learning. Instructional designers must be explicit in helping students to develop these competencies as students perform activities that are aligned with domain-specific content learning outcomes.

When providing supports for active learning and collaboration as part of the development phase, it is important to:

- Develop learning tasks/activities that align to content learning objectives and SEL skills (identification)
- Develop meaningful, active learning activities that engage students in accomplishing the learning objectives (operationalization)
- Develop instructional support for practicing the identified SEL skills during the activity.

Reflection and Self-Assessment

Besides developing the inter-personal competencies, SEL instructional development provides support for the intra-personal dimensions of learning. These include self-regulation of activities and emotions during learning, as well as metacognition – the "thinking about one's own thinking" (Flavell, 1979). Additionally, intra-personal aspects of SEL embrace intellectual openness, adaptability and appreciating multiple perspectives (NRC, 2012; Bogard et al., 2018).

Instructional designers can help students to develop intra-personal dimensions of SEL by embedding tools that provide opportunities for

students to develop skills in planning/managing complex tasks, goal setting, self-assessment, peer assessment and reflection on learning outcomes. With support for these processes, self-regulation of learning, self-reflection and self-understanding of one's strengths and challenges become strategies for managing complex tasks and can support students in developing resilience, confidence and a sense of themselves as independent learners, which are useful states of mind when solving complex, ill-structured problems (Bogard et al., 2013). Ideally, the instructional design "should help students to develop students' metacognitive capacity, agency, and the capacity for strategic learning" (Darling-Hammond et al., 2020, p. 111).

Consequently, it is important to embed opportunities for students to reflect on their emotions, thoughts and behaviors at different points in the teaching-learning cycle. By making these transparent, students become attuned to the emotional-cognitive demands of the learning. With the instructor's support alongside affordances built into the learning environment, students can discern strategies to regulate and redirect negative emotions into proactive coping behaviors that can drive learning forward rather than obstruct it (Markowitz & Bouffard, 2020).

In this vein, the learning environment is designed to normalize productive struggle and challenges. It is good practice to provide opportunities for students to notice and name challenges that they encountered and the ways in which they went about solving the issue or working around a constraint. Although an instructor scaffolds students in overcoming challenges, the student is in the driver's seat and narrates the approaches taken in confronting obstacles in their way. By reflecting upon and narrating both failure and success stories, students take agency in their own learning, and failure becomes seen as productive to learning (Bogard et al., 2018).

Instructional designers can embed self-assessment tools to help students monitor their social-emotional growth and take responsibility for their own learning. Self-assessment tools are available to help learners gain a deeper understanding of their strengths and areas of improvement, set and monitor goals and track their progress over time. Some surveys that can be embedded in the learning environment include a time management questionnaire, SMART goal setting with students, a student agency rubric and others. Having a plan to approach a task that is aligned to a learning goal enables one to see how they are progressing in the direction of that learning goal. It also allows for receiving targeted feedback that advances progress. Seeing progress helps to boost positive self-talk and agency in one's learning. Feedback that is formative and provided in situ is specific, timely and public, and it is effective in not only advancing learning but also in fostering a growth mindset and perseverance (Dweck, 2006; Shute, 2008). By incorporating asset-based feedback, the teacher provides feedback that is aligned to the learning goal or target and helps students in identifying their strengths and an actual path to improvement that the student can quickly adapt as they progress toward the learning goal (Shute, 2008).

In summary, there are several instructional design approaches that can be used to help students to develop intra-personal competencies. These include helping students to recognize and manage emotional reactions, embrace productive struggle, and set and monitor goals. These are as much design tool considerations as they are teacher moves. Both the teacher and the tools work

hand in hand to provide students support for the inter-personal dimensions of learning. These develop through providing students ample opportunities to reflect on their learning processes, not merely the learning outcome. While performance is important, consideration is given to both process and product, with an emphasis on cultivating mastery learning orientations.

Therefore, during the development phase of the ADDIE process, it is important to anticipate where students will benefit from structured opportunities for self-regulation and developing self-awareness during problem-solving tasks. Instructional designers can:

- Embed reflective prompts, self-assessment and discussion on the SEL competencies associated with the learning objective
- Identify points for the instructor to provide formative, targeted feedback on both the content learning and SEL competencies being developed
- Develop rubrics for assessments that measure academic, social and emotional growth in relation to the learning outcomes

Supportive and Responsive Learning Environment

Providing a supportive and caring learning environment is a critical design element for SEL and is multifaceted. It is the implementation of all the design elements previously discussed coming together to support the cognitive, social and emotional dimensions of learning. But these design elements are of little value if they are not used in support of creating caring relationships and responsive learning communities. If students feel unsupported, then it is likely that they will be less motivated and engaged in the learning tasks.

At the core of these practices and design elements is the assumption that there is a caring instructor and that relational interactions among peers and the instructor are critical for deep learning. More specifically, the design elements rest on the assumption that SEL requires “classroom relationships based on trusting, encouraging interactions between the teacher and each student, and the development of positive relationships among the students” (Darling-Hammond & Cook Harvey, 2018, p. 21). Important to building strong teacher–student relationships is fostering a sense of belonging. Students are allowed voice and choice in their learning. In addition, social skills and norms of the discipline are explicitly taught and practiced to help students engage meaningfully with the content and with respect and care for one another. It is important that teachers adopt an apprentice-style relationship whereby “knowledgeable practitioners or peers facilitate students’ ever-deeper participation in a particular field” (2018, p. 29). In addition, the teacher models SEL in action by demonstrating active listening, self-regulation, empathy and respectful communication (Markowitz & Bouffard, 2020).

Another facet of creating a supportive classroom environment is providing students online support resources that they can choose to engage that align with the specific learning objectives and the varied needs of students. Providing access to articles, websites, books, and other materials can support students’ understanding and exploration of SEL topics in relation to the content they are learning.

Finally, maintaining a supportive learning environment requires being responsive to students’ needs as their needs emerge in order to continuously

improve the course and support student learning. Therefore, it is important to collect feedback from students about their learning experiences and regularly use it to make adjustments to the course. Thus, the implementation and assessment of the design is informed by the overall implementation of SEL in facilitating positive learning outcomes.

As part of the implementation and evaluation phase of the ADDIE process, instructional designers can ensure continuous improvement of the learning climate and outcomes when they:

- Embed tools for soliciting student feedback on the learning experiences throughout the course
- Consult with qualified instructor(s) in implementing/improving supports for building positive teacher–student rapport and providing targeted feedback
- Provide online resources for additional assistance and practice for content mastery and SEL development
- Use data from student feedback and learning outcomes to identify areas where the course design can be improved for supporting SEL
- Measure the effect of SEL supports on student learning outcomes

Summary of Key Principles

1. Widely recognized for the past two decades as the industry standard for social emotional learning (Berman et al., 2018), the core competencies of the CASEL model include: self-awareness, self-management, social awareness, relationship skills and responsible decision-making. These five competencies comprise the CASEL model for promoting long-term emotional wellness and sustained academic progress for students. The CASEL model has been adapted to meet the needs of various professions, as its value is also recognized in terms of career readiness and workforce development.
2. SEL enhances student emotional well-being, academic achievement and career readiness/success. SEL research indicates that consistent usage of SEL in school settings leads to significant benefits for students in terms of mental and emotional wellness and academic achievement. SEL interventions that addressed the five core competencies increased students' academic performance by 11 percentile points, compared to students who did not participate (Mahoney et al., 2018). Additionally, participation in SEL programs is linked to decreased emotional distress, more positive attitudes about self and others and fewer externalizing behaviors and discipline problems (Mahoney et al., 2018).
3. SEL draws upon the science of learning and developmentally appropriate practice, which recognizes that “thinking, feeling, behavior, and social relationships are all inextricably linked and work together to produce learning” (SOL brief, p. 11). Thus, instruction design that is committed to SEL provides instructional scaffolds for the cognitive, interpersonal and intra-personal dimensions of learning.
4. SEL must be intentional and integrated to be effective. The efficacy of SEL rests in the deliberate and

consistent use of the core competencies throughout instructional design. These competencies are intentionally aligned with content learning objectives. In other words, instructional designers should infuse social, emotional and cognitive skills into academic content learning throughout the course.

5. The ADDIE instructional design model lends itself to the

implementation of SEL with attention given to five design elements: 1) intentional SEL integration, 2) incorporating engaging and relevant instructional materials, 3) providing structures for active learning and collaboration, 4) providing frequent opportunities for reflection and self-assessment and 5) creating and sustaining a supportive learning environment.

Application Questions

1. You have been contracted as a consultant for a school to evaluate their implementation of SEL practices. The school administration is concerned that they are not seeing the benefits traditionally associated with SEL in their student body. You would like to gather more information in terms of how SEL is being utilized during instruction. What questions would you ask administrators and teachers with respect to each of the design elements presented in this chapter?
2. You are designing a statistics course for students who are earning a certificate in program evaluation. You have decided to adopt a problem-based learning (PBL) approach whereby students are presented with scenarios for applying statistical tests and analysis. What SEL competencies would you build into the structure of the model to support student engagement, persistence and achievement in this course? How would you use the ADDIE model to facilitate these design considerations?

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Problem-Based Learning

Essential Design Characteristics

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Problem-based learning (PBL) represents a student-centered instructional approach, designed to facilitate students' active construction of knowledge through deep engagement with meaningful problems (Hmelo-Silver, 2004). The PBL model was formalized in medical education during the 1960s as a way of responding to problems of inert knowledge (Whitehead, 1929) and low motivation among medical students (Gijsselaers, 1996). More specifically, medical faculty had observed that previously learned information could not be applied at the moment of patient diagnosis and treatment (Barrows, 1996). By engaging students in authentic, relevant medical problems from the start of their professional education, faculty aimed to foster student motivation, professional knowledge, and clinical skills, and more than 50 years of research has demonstrated success toward these outcomes (Dochy et al., 2003; Gijbels et al., 2005; Moallem et al., 2019; Strobel & van Barneveld, 2009; Walker et al., 2015).

According to Barrows and Tamblyn (1980), PBL comprises "the learning that results from the process of working toward the understanding or resolution of a problem" (p. 18). In general, the goals in PBL are twofold: 1) to promote deep understanding of subject matter content while 2) simultaneously developing students' critical thinking skills (Barrows, 1996). More specifically, PBL employs *real-world problems* as vehicles to stimulate student motivation, contextualize disciplinary content, and facilitate the growth of higher-order thinking skills. Students learn to analyze these problems, using authentic tools of the discipline (e.g., primary source documents, graphing calculators, scientific probes), in order to identify what information they need, how to integrate facts and concepts from different disciplines and sources, and how to evaluate the strength of their proposed solutions. Furthermore, the curriculum is structured to foster group work, self-directed learning, critical thinking, and self-reflection (Ge & Chua, 2019; Hmelo-Silver & Barrows, 2006).

In response to calls by educators, legislators, and policymakers to develop innovators, creative thinkers, and inventors (Liu & Pásztor, 2022; Tan, 2021), PBL has been gaining in popularity in both K–12 and higher education contexts

(American Institutes for Research [AIR], 2014; Ravitz, 2009). Although less common, PBL is also used as a training approach in the workplace, particularly when training goals comprise the development of decision-making or problem-solving skills. For example, PBL was used to introduce school personnel and emergency managers to critical decision-making processes when faced with severe weather outbreaks (Stalker et al., 2015). In a similar manner, the U.S. Air Force Research Laboratory (Andrews et al., 2009) used PBL to teach decision-making processes to aeronautical management trainees, preparing them to “draw on a decision process tied to issues of working through complex events with high stakes outcomes” (p. 13) when faced with a serious airplane malfunction.

According to Barrows (1986), PBL implementations exist along a continuum from short, isolated implementations on the one end to full curricular integration on the other. Bereiter and Scardamalia (2000) referred to these levels of implementation as *upper-case PBL* and *lower-case pbl*. In general, upper-case PBL comprises “a distinctive, well documented instructional approach that originated in medical education” (p. 185), while lower-case pbl refers to “an indefinite range of educational approaches that give problems a central place in learning activity” (Bereiter & Scardamalia, p. 185). As such, an examination of learning outcomes from PBL should be accompanied by a critical review of the implementation description to determine the extent to which the approach reflects signature elements of PBL pedagogy. This will prevent readers from drawing incorrect inferences about PBL that should, in reality, be attributed to other problem-centered methods.

PROBLEM-CENTERED METHODS: SIMILARITIES AND DIFFERENCES

Teachers, instructional designers, and other educators often question the similarities and differences between PBL and other forms of problem-centered instruction. In general, we view these methods as all falling under the broad classification of inquiry-based learning (IBL). According to Healy (2005), IBL is an instructional approach that “mimics, as closely as possible, the actual pattern of inquiry in the discipline being studied” (p. 68). As such, IBL is characterized by complex, relevant, and authentic learner experiences, which are driven by real or realistic problems (Edelson et al., 1999). Under the IBL umbrella, a variety of problem-centered practices exist. In addition to PBL, two of the more common methods include case-based instruction (CBI) and project-based learning (PjBL). Differences between approaches are often quite subtle, but we argue that the distinctions generally fall along four dimensions: authenticity of problem (e.g., realistic vs. real); purpose, as well as timing, of problem introduction (e.g., knowledge application vs. knowledge building; introduced before or after all relevant knowledge is gained); problem type/degree of structuredness (e.g., well-structured vs. ill-structured); and type of final product produced (e.g., case analysis vs. project artifact vs. problem resolution). Table 13.1 illustrates these differences across the three approaches. In this chapter, we use the term PBL to refer, specifically, to the learning approach represented by the last row of the table.

Specifically, PBL is defined here as a student-centered instructional approach that incorporates the following features: 1) use of authentic ill-structured problems that are introduced before all the relevant content is learned;

TABLE 13.1 Dimensions of Difference Between Three Inquiry-Based Learning Practices

	Authenticity of Problem	Problem Purpose; Timing of Problem Introduction	Problem Type/ Structuredness	Type of Final Student Product
Case-Based (CBI)	Realistic	Application of complex and general disciplinary knowledge. Students engage with problems that typically have been experienced by practitioners in the field. Typically introduced after concepts are learned with the expectation that students will <i>apply</i> prior knowledge.	Complex scenario/ semi-structured <i>Example: Engineering students are asked to assume the role of practicing engineers in preparing a design solution for building a better cast saw that accounts for stakeholder needs, given resources, constraints, and supports.</i>	Analysis and recommendations relevant to issues in problem situation (typically written and reflecting knowledge application)
Project-Based (PjBL)	Realistic	Application of complex and cross-disciplinary knowledge. Introduced after concepts are learned with the expectation that students will <i>apply</i> prior knowledge.	Complex/ semi- or well-structured <i>Example: Build a better cast saw.</i>	Project artifact (poster, plans, brochure, presentation, or other artifact)
Problem-Based (PBL)	Real or realistic	Integration of prior knowledge with new knowledge; opportunities for additional knowledge building. Introduced before all relevant knowledge is acquired.	Complex/ ill-structured <i>Example: How can we reduce incidents of injury and litigation resulting from cast saw injuries?</i>	Evidence-based problem resolution (typically a solution or recommendation)

2) support for and facilitation of self-directed student learning; 3) scaffolding of students' knowledge building; 4) cooperation and collaboration among students, teachers, and community members; and 5) authentic assessment of both process and product, including evidence-based recommendations for problem resolution (Ertmer & Glazewski, 2015, 2019; Glazewski & Ertmer, 2020; Grant & Hill, 2006). It is important to note that while these five components are considered key features of PBL, they are not unique to PBL. For example, scaffolding, collaborative learning, and authentic assessment are typically included within PjBL and CBI approaches as well. In this chapter, however, we focus specifically on how these five components are reflected within a PBL approach. Next, we discuss each component in more detail.

Use of Authentic Problems

In a PBL approach, problems, rather than topics or subjects, are used to anchor the curriculum (Stepien & Gallagher, 1993). Typically, the learning process begins when learners are confronted with an authentic problem or puzzle they wish to solve (Boud, 1985). Furthermore, "the problem comes before the knowledge (in the broadest sense) needed to solve or resolve it" (MacDonald & Isaacs, 2001, p. 317). This, then, is one of the defining characteristics of PBL – prerequisite disciplinary content knowledge is not introduced or mastered prior to asking students to apply that knowledge to solve real-world problems. As such, the problems drive the curriculum, and it is through solving these problems that students acquire content knowledge (Barrows, 1983; McConnell et al., 2017).

Problems in PBL comprise complex, ill-structured situations or dilemmas, which generally allow for multiple workable solutions as well as multiple paths to those solutions (Jonassen, 2011). Typically, the problem is presented to students in the form of a driving question (see Table 13.2) that quickly engages students' interests and inspires a "need to know." According to Larmer and Mergendoller (2012), a good driving question "captures the heart of the project in clear, compelling language, which gives students a sense of purpose and challenge. The question should be provocative, open-ended, complex, and linked to the core of what you want students to learn" (p. 2). For example, two middle school teachers developed a year-long PBL unit that revolved around the question "What do sustainable and resilient food systems look like?" which provoked strong responses among their students and motivated them to engage (Wallace et al., 2017). Thus, the question brings purpose to the activities students undertake as part of the PBL unit, connecting their efforts under a unifying goal. Without a good driving question, learning efforts may not seem worth the hard work required. That is, students may lose sight of the authentic reason for their work and end up placing emphasis on interesting, but not very relevant, activities (e.g., "We're making a poster.").

Self-Directed Student Learning

Self-directed learning (SDL) is defined as "a process in which individuals take the initiative . . . diagnosing their learning needs, formulating goals, identifying human and material resources, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975, p. 18).

TABLE 13.2 Sample Driving Questions and Associated Disciplines/Content Addressed by Each

Primary Discipline	Driving Question	Primary Content Covered
Science	- How can biofuels be used to meet our energy needs? - What are the physiological and social mechanisms that drive addictions?	Biology – cellular processes Chemistry, Biology, Humanities
Social Studies	When are nations justified in using military force against other countries?	Persistent issues in history
Science/Social Studies	Who is responsible for ensuring a safe food and water supply in our community?	Thermodynamics Water treatment Water rights
Math	- How can we, as concerned citizens, determine if the speed limits in Ripley County need to be changed to make them safer? - What would be the best use of a building's physical space to create a new aquarium installation?	Algebra – linear equations Geometry, Aquatic Ecosystems
Social Studies/Math	Why should kids care about the price of gas?	Cost–benefit analysis Political science
Engineering	- How is a new solar energy product developed, engineered, and marketed for the public? - How can we design, build, and test a water purification system?	Physics, Engineering, Marketing Engineering design; Science – water systems
Technology	- How can we plan, design, and model a biomass conversion plant in our community? - What makes something strong?	Technology as a system Structural and material properties

Adapted from Mong and Ertmer (2013).

These processes of SDL are considered critical to success in PBL (Ge & Chua, 2019). Barrows (1983) advocated for small groups of students to identify topics that required further exploration, divide topics among the group members, and devote time to individual research before reconvening to discuss findings. He observed that students initially tended to resist expectations of SDL, but quickly experienced success. Barrows attributed their success to the social pressure to appear proficient in front of peers, combined with the fact that

continual practice of the skills led to greater competence. Once groups reassembled, they reported findings, revisited earlier hypotheses, brainstormed and critiqued new ideas, and developed a treatment plan. Barrows concluded that while self-directed processes are not easy for most students, they are critical to PBL and can be developed given practice and guidance.

Blumberg (2000) came to similar conclusions regarding student self-direction. In a review of research studies, she examined evidence of SDL along three dimensions: learning processes, strategies, and tasks involving application or transfer. Student self-reports and faculty observations of students were consistent: both groups reported that effective SDL skills were developed over time, and in some cases, participants perceived that PBL was more effective at fostering these skills than conventional curricula. Similarly, Chua et al. (2014) found evidence that the SDL skills possessed by preservice teachers played a critical role in determining the extent to which they benefited from a PBL approach.

However, this is not to imply that SDL automatically occurs within PBL, but rather that it should be modeled, cultivated, and fostered (Ge & Chua, 2019). In some cases, this may involve a considerable time investment, as observed by van den Hurk et al. (1999). The authors reported that during multi-year PBL experiences, students in the first year tended to narrowly pursue the identified learning issues but in later years, many students allowed their learning to take diverse directions according to personal interests. Results suggested that those who engaged with diverse, personal interests tended to perform better in the courses.

In other cases, nurturing SDL may require directly teaching active learning strategies to students. In one study, in order to tackle problems of “PBL fatigue,” researchers taught students a four-stage SDL cycle: 1) activation of prior knowledge, 2) exploration of available resources with direct relevance to future professional goals, 3) integration of ideas across disciplines, and 4) application of knowledge through papers, public forums, and reflection (Czabanowska et al., 2012). Students responded the most positively to phases one and four of the cycle, as those were perceived to most directly interest them or benefit their learning. However, students struggled with the exploration and integration phases, finding the workload to be taxing and noting a lack of resources available to support their efforts to make cross-disciplinary connections. The authors concluded that students may need more assistance, especially during early exposures to PBL, which is why scaffolding represents such a critical component of the PBL learning environment.

Scaffolding of Student Knowledge Building

While there is growing evidence that PBL activities promote the development of higher-order skills such as critical thinking and problem solving (Swan et al., 2013; Strobel & van Barneveld, 2009; Tiwari et al., 2006; Wirkala & Kuhn, 2011), there are difficulties associated with supporting student-centered learning. From the student’s perspective, succeeding within problem-based activities requires multiple self-directed tasks: setting meaningful goals for completing the activities, assuming more responsibility for meeting those goals, and monitoring progress to determine if the strategies being used are effective (Barrows, 1983; Blumberg, 2000; Ertmer & Glazewski, 2015; Hmelo-Silver et al., 2007). These issues have led to the suggestion that additional guidance, or *scaffolds*,

be used to assist students and teachers engaged in this type of learning (Ertmer & Glazewski, 2019; Wood et al., 1976). Scaffolds can take many forms, but serve to support and guide students in attaining a higher level of understanding than would be possible if students worked on their own, especially given the complexities of the PBL process (Hmelo-Silver et al., 2007).

Saye and Brush (2002) conceptualized two forms of support: soft and hard scaffolds. *Hard scaffolds* represent static supports that can be anticipated and planned in advance, based upon known, or anticipated, student difficulties with a task. These support structures are typically embedded within learning environments to provide students with support while they are actively engaged with a problem (Belland et al., 2011; Sandoval & Millwood, 2011; Simons & Klein, 2007; Wu & Pedersen, 2011). For example, Belland et al. (2011) developed an online system, the *Connection Log*, to support middle school students in organizing information, sharing content, and developing evidence-based arguments as they made decisions about uses of human genetic information. The researchers noted that the system benefited all learners, not only on their team project but also on a transfer task that required individual evidence-based arguments. Furthermore, students with the highest gains were low achieving learners, supporting the hypothesis that such forms of hard scaffolding can contribute to success for a wide range of learners.

In contrast, *soft scaffolds* are dynamic, situation-specific supports provided by a teacher, trainer, or peer. Such scaffolding requires facilitators to consistently monitor learner understanding and provide targeted support at critical moments (Saye & Brush, 2002). For example, in a community health fair context, a healthcare educator asked parents to bring the various information sources they used to inform their decisions about getting their children vaccinated to an FAQ session. She then facilitated a discussion to help them discern bias in the accounts from pro- and anti-vaccine groups. As the parents discussed their sources, the healthcare educator scaffolded their thinking by asking questions such as: “Who wrote this piece?” “Why do you think the author uses the word ____?” “Do the authors use evidence based on research or anecdote?” Once parents attained deeper understanding of the existing biases in different media accounts, the healthcare educator referred them to other sources that provided research-based evidence related to the use of vaccines among children.

Of course, not all forms of scaffolding fall precisely into “hard” or “soft” categories, and for these reasons Puntambekar and Kolodner (2005) employed the term “distributed scaffolding” to capture the range of supports that may be available across the instructional setting. Furthermore, Pea (2004) noted the need to blend forms of scaffolding within a learning environment:

It seems possible to imagine “mixed initiative” designs of scaffolding processes in which people and machines join together in helping someone learn something in the sense that certain scaffolding activities can be the responsibility of the teacher . . . and other scaffolding activities be provided by the software.

(p. 444)

Thus, it is important for instructors and designers to consider which supports are best provided by software and which are best provided by the teacher to optimally facilitate problem solving among students.

As a recent example, middle school students addressed an authentic problem related to ecosystems in a problem-based, game-based learning environment. In this study, researchers investigated the interplay between both the forms (i.e., hard and soft) and functions (i.e., inquiry processes and engagement with ideas) of scaffolding (Saleh et al., 2020). Results showed that hard scaffolds were generally successful in supporting collaborative inquiry processes, while soft scaffolds fostered students' engagement with ideas. These results illustrate the potential benefits of blending the two scaffolding designs.

Scaffolding can also represent an important pedagogical move toward more equitable and inclusive opportunities for engaging a diverse range of learners. Historically, complex problem solving was considered a form of "advanced" learning; furthermore, when PBL was introduced in K–12 classrooms, it was originally formalized in gifted education (Glazewski & Ertmer, 2020). However, in one study of a ninth grade PBL biology unit, researchers compared learning gains for learners with lower versus higher levels of prior knowledge and observed that those in the lower prior knowledge group had statistically significant knowledge gains, whereas students with higher prior knowledge did not, despite room for growth (Brush et al., 2021). This suggests that engagement in PBL, coupled with scaffolded resources, may have even stronger positive effects for those who enter without a deep knowledge base. Still, it is safe to assume that nearly all learners will require support in one form or another, whether for cognitive demands, collaborative negotiation, problem-solving processes, or any combination (Kim & Tawfik, 2021; Savery, 2019; Shin et al., 2020).

Cooperation and Collaboration Among Students, Teachers, and Community

Collaboration is another key component of PBL learning environments, as it allows students, or trainees, to draw on each other's perspectives and talents to devise well-conceived, effective solutions for the problem(s) at hand (Fontejn & Dolmans, 2019). Furthermore, working in groups provides an important opportunity for learners to practice and master key communication and interpersonal skills, as well as time management and self-directed learning skills.

While students typically enjoy group work, group time is not always used productively and teachers need to enlist strategies to ensure that relevant content is addressed. According to Larmer and Mergendoller (2012), a teacher in a PBL environment must explicitly teach and assess collaboration skills, as well as provide frequent opportunities for students to assess themselves. The use of frequent checkpoints and record-keeping devices (e.g., group folders, design diaries, goal charts) can keep students focused and provide opportunities for reinforcement or redirection. These techniques also serve motivational purposes, as they allow students to observe their ongoing progress (Ertmer & Glazewski, 2015).

As an example, designers of *Crystal Island: Ecojourneys* leveraged principles from immersive game- and problem-based learning to engage middle school students in investigating causes of sickness on an island fish farm (Saleh et al., 2020). Students performed both individual investigations and joint collaborative work as they progressed through the game. Individually, students explored different hypotheses, ran tests, and spoke to different characters in the

game (e.g., scientists, research assistants, and guides) through branching narratives. At three different checkpoints, they met with their collaborative group to explore findings and jointly construct explanations. In this example, requirements for individual exploration ensured each learner was accountable for his/her knowledge and understanding before engaging in collaborative work.

Establishing a collaborative classroom or training culture requires instructors to assume a facilitative, rather than directive, role. As such, instructors engage with learners through a variety of modeling and scaffolding techniques: asking good questions, demonstrating productive thinking patterns, providing just-in-time resources, leading debriefing sessions, and facilitating whole-group and individual reflection (Ertmer & Glazewski, 2015). In general, instructors may require a period of transition, and lots of practice, before they feel comfortable assuming this type of facilitative role (deChambeau & Ramlo, 2017; Lee & Blanchard, 2019; Shuster et al., 2020).

Authentic Assessment of Process and Product

In PBL approaches, instructors commonly rely on a wide range of assessment practices, with most instructors using a variety of methods within each unit. In a study of student experiences in PjBL, Grant (2011) noted some of the acquired learning was unseen by the teacher and concluded that it was unreasonable to expect artifacts to represent all that was learned. Generally, assessment practices can be divided into three broad categories: 1) *en-route*, for the purpose of monitoring student progress and assessing the learning process; 2) *culminating*, for the purpose of observing students' direct responses to the problem under investigation; and 3) *individual*, for the purpose of determining individual student mastery of targeted content. Table 13.3 illustrates how these three types of assessment might play out in different contexts and disciplines.

The first form of assessment comprises *en-route* tasks such as papers, journals, whole- or small-group debriefings, reflections, models, or other representations of learning, primarily for the purpose of monitoring student progress. Research suggests that students perform better when these types of *en-route* benchmarks are in place. In one study, researchers observed two groups of law students, some of whom voluntarily completed six *en-route* tasks and others who did not (Gijbels et al., 2005). These tasks comprised additional deep application of the learning material. Those who completed the additional tasks performed better on the final exam and reported greater course satisfaction than those who did not. The authors attributed students' successful outcomes to increased time spent in meaningful and productive *en-route* work outside of class, which served to deepen individual learning.

A second form of assessment is the *culminating* activity, which represents a direct response to the problem or question under investigation. The *culminating* activity is an essential component of PBL; without it, the problem-centered approach being implemented would not be classified as "true" PBL. This relates, specifically, to the fact that PBL instructors are most interested in implementing strategies and assessments that reflect complex problem solving (Gijbels et al., 2005). Barrows (1986) noted that assessment methods direct how students study, and therefore must reflect problem solving, clinical reasoning, and self-directed learning: "Without these assessments, the educational objectives for PBL are weakened as students will not honour them in their study."

TABLE 13.3 Examples of Assessment Approaches in Three Different PBL Contexts

Context	Driving Question	En-Route	Culminating	Individual
K–12 Science	Should there be a meat tax?	• Team milestones for debate preparation (e.g., argument development, gathering supporting evidence) • Draft of PP slides for feedback	• Stakeholders' debate	• End of unit assessment • Policy proposal
Medical Education	What is the best treatment plan for Mrs. Garcia?	• Presentations to group members on identified learning issues • Use of KWL chart (What do we Know? What do we Want to know? What have we Learned?)	• Differential diagnosis and treatment plan	• End of unit assessment • Board exams covering specific content knowledge
Engineering Education	What can be done to reduce incidents of injury and litigation resulting from cast saw injuries?	• Preliminary design documents	• Detailed design documents • Prototype of proposed new cast saw	• End of course test

The teacher will never know whether the students are meeting these objectives" (p. 485). In medical education, a typical assessment is directly linked to the problem; that is, students develop a recommendation for the patient-case examination, as illustrated by the following example (adapted from Barone & Sattar, 2009):

[Mrs. Garcia] A 30-year-old Hispanic woman, who speaks little English, is brought to the emergency department because of her agitated and restless behavior. The patient's history indicates she delivered a healthy baby boy at your medical clinic last month. She had attended the prenatal clinic on a regular basis. Her previous labs are attached. The patient is not willing to stay in bed. She

is very agitated, loud, and swearing at people. She is afraid and looking behind herself constantly. She refuses to allow the nurse to examine her or draw blood.

(p. 35)

As students work through the case, a tutor facilitates the learning process, which culminates in diagnosis and a treatment plan.

Culminating activities can take on many other forms depending foremost on the nature of the driving question. In a unit that asked students to address the driving question “Should there be a meat tax?” students were assigned to stakeholder teams (e.g., farmer, parent, ecologist, or medical doctor) and then asked to present, in a culminating class debate, a reasoned, well-supported position from their assigned point of view (Brush et al., 2014). In addition, the teacher had students complete a second, individual culminating assessment that required a written policy recommendation reflecting their own positions on the issue supported by strong science- and sociology-based arguments.

A third form of assessment comprises an individual measure, which is typically an exam or position paper reflecting the identified content objectives. Depending on the organization of the learning experience, this could be an end-of-course exam composed of learning objectives across the full semester, or it might be a unit-based assessment reflecting targeted goals. For example, the teacher of the meat tax unit developed specific learning objectives to be tested at the end of the unit, four of which included:

- Describe the role of photosynthesis in the food web.
- Determine the ecological/energy significance of eating foods at different levels of the trophic pyramid.
- Graph and hypothesize causes and effects for human population changes.
- Predict outcomes of antibiotic use in meat production based on natural selection.

The teacher developed a criterion-referenced exam to administer to each student, which informed both knowledge of individual performances as well as patterns of performance in meeting the state standards aligned with the objectives.

As noted previously, most PBL implementations involve more than one form of assessment, as it is impossible to represent all that is learned in a single artifact or measure of performance (Grant, 2011). Additionally, PBL instructors often include opportunities for students to engage in both peer and self-assessment, in order to examine, more clearly, how students are approaching the learning process itself, including the use of SDL skills. In many instances, an additional “community” assessment is included via a public presentation of students’ work. Given the multiple goals of PBL (i.e., content learning and development of higher-order thinking skills), the use of multiple assessment measures enables teachers to better gauge how students are progressing toward mastery of both content and SDL skills throughout the PBL process.

CONCLUSION

A wide variety of problem-centered methods are used in classrooms and professional training contexts, including those that focus primarily on projects,

cases, or problems. Problem-based learning encompasses a distinct variety of problem-centered instruction: that is, PBL comprises the use of authentic complex problems that are introduced through an engaging driving question before all the prerequisite disciplinary knowledge has been gained. The learning experience culminates in a final demonstration or application of that knowledge and may involve a public venue attended by interested stakeholders.

Educators and researchers who promote the use of PBL stress that students' engagement with the problem itself deepens students' motivation to do the hard work of complex problem solving (Almulla, 2020; Orji & Ogbuanya, 2022; Wirkala & Kuhn, 2011). Thus, identifying and crafting an engaging driving question is a critical responsibility of a PBL instructor. Furthermore, as noted by Hmelo-Silver et al. (2007) and highlighted here, considerable planning is directed toward the implementation details, which includes how to promote and support collaboration among students and stakeholders, how to provide the appropriate type and level of hard and soft scaffolds, and how to devise and implement assessment measures that capture both individual and team learning details (Ertmer & Glazewski, 2015).

In summary, this chapter provides a brief overview of the tenets and practices of PBL. However, given the brevity of this chapter, we recommend that it be regarded as an introduction only. We do not intend to give the impression that this chapter presents all the required information needed to design or implement a true PBL unit. As any PBL adopter will attest to, the degree of planning required, at least at first, is substantial (Czabanowska et al., 2012; Ertmer et al., 2009; McConnell et al., 2017). Still, given the potential rewards in terms of both student engagement and learning (AIR, 2014; Dochy et al., 2003; Swan et al., 2013), these initial investments of time and energy appear to be more than warranted. As our readers move forward, we encourage them to 1) build on the knowledge gained here by accessing additional, available resources that detail PBL implementation strategies and 2) critically examine research that documents evidence-based outcomes, with specific attention to the description of the environment in order to understand the essential elements that contribute to a robust, meaningful learning experience.

Summary of Key Principles

1. The goals of PBL are twofold: to promote students' deep understanding of discipline-based content and to support the development of higher-order thinking skills.
2. Authentic complex problems are used to anchor the curriculum. Within a PBL unit itself, a driving question provides both the purpose and motivation for students' learning; that is, it makes the hard work of complex problem solving worth the effort.
3. PBL is distinguished from other problem-centered approaches, such as project- and case-based learning, by 1) its use of authentic, real (as opposed to realistic) problems; 2) its engagement of students in multidisciplinary problem solving *before* all the relevant knowledge is learned; 3) the ill-structured nature of the problem to be solved; and 4) its focus on the development of a recommendation/solution for addressing the problem (as opposed to the development of a single artifact).
4. The five main characteristics of PBL include: 1) the use of authentic

ill-structured problems that are introduced before all the relevant content is learned; 2) the support for and facilitation of active, self-directed student learning; 3) scaffolding of students' knowledge building; 4) cooperation and collaboration among teachers, students, and community members; and 5) authentic assessment of both process and product, including evidence-based recommendations for problem resolution.

5. Scaffolds play an important role in supporting students' efforts during complex problem solving and

can represent a critical pedagogical move for expanding access to and inclusion for a diverse range of learners.

6. No one artifact can completely capture what is learned in PBL; multiple forms of assessment are needed.
7. Given the wide variety of PBL implementations, consumers of PBL literature must pay close attention to authors' descriptions of the goals, context, and manner in which the implementation took place. Use of a PBL label does not necessarily equal a true PBL approach.

Application Questions

1. Consider the following descriptions. Classify each as an example of problem, project, or case-based learning and explain why you think it represents that approach.

- Based on the assigned readings, choose one of the primary contributions of the Human Genome Project and create a representation detailing how that contribution came about.
- Based on last week's work, read the account of how this genetic counselor advised the couple in this example, as well as their reactions to his advice. Provide a specific recommendation for the family, taking into account their unique risks for genetic disorders. Provide a list of pros and cons for your recommendation.
- As you will read, the plaintiff accuses the defendant of intentionally injecting her with the HIV virus. What forms of evidence matter most? As a sitting jurist on this case, how would

you use that evidence to influence your vote? (adapted from Regassa et al., 2013).

2. The roles that teachers and students play in a PBL context look different than they do in a traditional classroom environment. Create a chart that contrasts what a teacher/instructor does in a PBL classroom vs. what she would do in a traditional classroom. As a starting point, consider the different characteristics of a PBL approach (see #4 of the PBL principles) and then outline what a PBL teacher/instructor would need to do to successfully facilitate each component.
3. Consider the following scenario of a high school teacher who implemented a PBL unit in his ninth grade biology class. Make recommendations for how Mr. Kaynor might improve the results obtained on the final assessment.

To introduce his biology students to the topic of genetics, Mr. Kaynor designed a PBL unit around the question "Should

organizations be allowed to use personal genetic information to make decisions?" To assure that different perspectives were considered during the unit, students were asked to assume the roles of different stakeholders (e.g., parent, lawyer, scientist, or religious leader). The final culminating activity was structured as a debate – with groups of students arguing the position of their assigned stakeholders. Results of the unit showed that students were highly engaged in the unit and that, as a class, students performed significantly better on the teacher-created posttest than on the pretest. However, students who started with higher levels of previous knowledge didn't gain as much

as those who started with lower levels, even though there was plenty of room for growth. In talking to Mr. Kaynor about this result, he thought that perhaps the culminating activity was not too effective and proposed eliminating this in the future.

What are the potential pros and cons to this decision? What other strategies might the teacher consider for future implementations? How can Mr. Kaynor stay true to the PBL approach while assuring better learning outcomes?

4. Describe an inquiry-based approach that you have observed or experienced and classify it as problem, project, or case-based learning. Explain why it fits the category you selected.

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Keep It Real

The Benefits of Authentic Tasks in Contemporary Learning Environments

Christiane Reilly and Thomas C. Reeves

Boring e-learning fails to engage the learner's mind, and without that basic motivation and action, nothing can happen even when the learner goes through all the required motions.

– Ethan Edwards (2013), Chief Instructional Strategist, Allen Interactions

Due to the Covid 19 pandemic, the world of education was catapulted nearly overnight into online remote teaching (Hodges et al., 2020). Just when online learning had its opportunity to amaze the world, it failed to engage learners to an appalling extent, resulting in learning losses that continue to compound years later (Harmey & Moss, 2023). There are numerous reasons for this failure, but foremost is that the vast majority of online learning programs simply put learners through the “required motions” noted by Ethan Edwards in the epigraph to this chapter but failed to grapple with the most important factors needed for learning, specifically motivation, engagement, and action.

The failure of online learning in the wake of the pandemic has raised awareness of the need for evidence-based practices that foster engagement and deepen learning transfer. Authentic learning tasks are essential in motivating learners, maintaining their engagement, and enabling achievement across all four domains of learning: cognitive, affective, psychomotor, and conative (Reilly & Reeves, 2023). Advances in adaptive learning platforms, including those that incorporate artificial intelligence, promise to individualize learning, an assurance they keep only when it comes to adapting the learning pace and learning path for lower-level outcomes and discrete skills. Adaptive learning platforms do not personalize education or foster higher-order thinking. To go beyond rote learning of lower-level

outcomes to the development of future-facing skills requires active learning methods such as authentic, inquiry-based, problem-based learning experiences (Beetham & Sharpe, 2013; Bellanca, 2010; Bereiter & Scardamalia, 2008; Laurillard, 2013). These methods are the focus of this chapter.

In this chapter, we present an expanded set of authentic task principles that guide the design of learning experiences that motivate and engage learners (Reilly, 2020). We introduce the expanded design principles through a two-part design-based research study that resulted in two instructional design tools. The first design tool is a rubric that uses the design principles to quantify the degree to which active learning is present in the design of an online course (Reilly & Reeves, 2022). The second design tool is a new instructional design process for instructors, designers, and administrators to effectively map not only the disciplinary goals but also any higher-order competencies fostered by the learning design of a given online course (Reilly & Reeves, 2023).

We next discuss the implications that the expanded design principles have for a 21st-century learning design in which learners develop agency, creativity, cultural competence, and other transdisciplinary skills that are needed to shape the environmental, technological, demographic, sociopolitical, and economic disruptions humankind is facing.

Every generation faces challenges, but never before have young people been so aware of theirs. Whether due to school strikes for climate change, civil war, or pandemic lockdowns, almost every child in the world has experienced the interruption of their schooling by outside forces.

(Hannon & Peterson, 2021)

Authentic learning tasks meaningfully connect academic knowledge with these real-world relevant 21st-century themes and empower learners as agents of change so they “feel that they can help shape a world where well-being and sustainability – for themselves, for others, and for the planet – is achievable” (OECD, 2018). Finally, we illustrate the expanded set of design principles via a case study sequenced into design sprints that clarify how the principles are situated in instructional design practice.

THE ORIGINAL MODEL OF AUTHENTIC LEARNING

The pedagogical model of authentic learning, first developed by Herrington and Oliver (2000) and refined in the book *A Guide to Authentic e-Learning* (Herrington et al., 2010) was groundbreaking in that it captured the situated perspective (e.g., Brown et al., 1989; Cognition and Technology Group at Vanderbilt, 1990; Lave & Wenger, 1991; McLellan, 1996) in a set of design principles that would allow others to develop authentic learning environments and authentic learning tasks (see Table 14.1). Furthermore, the book placed the design principles on a “Continuum of Characteristics to Gauge Authenticity” complete with practical guidelines for implementation as well as guiding questions supporting the evaluation of authentic tasks.

TABLE 14.1 The Principles of Authentic eLearning (Herrington et al., 2010)

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1. **Real-world relevance.** Learning rises to the level of authenticity when it asks students to work actively with abstract concepts, facts, and formulas inside a realistic and highly social context mirroring the practices of the disciplinary culture.
 2. **Ill-defined.** Challenges cannot be solved easily by the application of an existing algorithm; instead, authentic activities are relatively undefined and open to multiple interpretations, requiring students to identify for themselves the tasks and subtasks needed to complete the major task.
 3. **Sustained investigations.** Problems cannot be solved in a matter of minutes or even hours. Instead, authentic activities comprise complex tasks to be investigated by students over a sustained period of time, requiring significant investment of time and intellectual resources.
 4. **Interdisciplinary perspectives.** Relevance is not confined to a single domain or subject matter specialization. Instead, authentic activities have consequences that extend beyond a particular discipline, encouraging students to think in interdisciplinary terms.
 5. **Collaboration.** Success is not achievable by an individual learner working alone. Authentic activities make collaboration integral to the task, both within the course and in the real world.
 6. **Reflection.** Authentic activities enable learners to make choices and reflect on their learning, both individually and as a team or community.
 7. **Articulation.** Learning activities enable presentation and defense of arguments.
 8. **Integrated assessments.** Assessment is not merely summative in authentic activities but is woven seamlessly into the major task in a manner that reflects real-world evaluation processes.
 9. **Polished products.** Conclusions are not merely exercises or sub-steps in preparation for something else. Authentic activities culminate in the creation of a whole product, valuable in its own right.
 10. **Multiple interpretations and outcomes.** Rather than yielding a single correct answer obtained by the application of rules and procedures, authentic activities allow for diverse interpretations and competing solutions.
 11. **Multiple sources and perspectives.** Learners are not given a list of resources. Authentic activities provide the opportunity for students to examine the task from a variety of theoretical and practical perspectives, using a variety of resources, and requires students to distinguish relevant from irrelevant information in the process.
-

THE EXPANDED MODEL OF AUTHENTIC LEARNING

Inspired by this work, an instructional design team at a large land-grant university in the midwestern United States put the original design principles to a test in a two-part design-based research study (McKenney & Reeves, 2019, Reilly, 2020).

In Part One of the study (Reilly & Reeves, 2022), the design team refined the original design principles articulated by Herrington et al. (2010) into a workable rubric used to conduct a pedagogical review of the learning design of 75 unique online courses. The course reviews yielded low (0–14), medium (15–21), and high (22–36) active learning (AL) scores that revealed the extent

to which active learning tasks were present in the learning design of a given online course. The researchers also surveyed the students in these online courses about what made learning meaningful and how. The learners’ survey responses, which were hand-coded into design principles, affirmed that the original authentic task principles (Herrington et al., 2010) strengthened students’ engagement and deepened their understanding. Additionally, learners articulated new learner-centered principles (see Table 14.2) as equally important to helping them stay engaged and learn. Noteworthy in the findings was

TABLE 14.2 Additional Principles of Authentic eLearning: Learner-Centered Principles (Reilly, 2020)

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- 12. **Learner agency.** Learning activities and assessments are learner led and provide scaffolds that support learners in their independent inquiry into a subject matter. Scaffolds adjust in structure from highly guided to open inquiry depending on learners’ abilities to self-guide their learning. Instructors act as coaches and mentors to support the learners’ inquiries.
 - 13. **Learner choice.** Learning activities and assessments provide learners with the freedom to choose how to execute their assignments and/or with the opportunity to personalize the assignment to personally relevant interests. This increases the learner’s ownership of the learning process so that learners are less likely to feel they are participating in a process owned by the teacher or the educational system. This freedom can also address the diversity of interests in the classroom.
 - 14. **Learner relevance.** When learning activities and assessments are rooted in learners’ backgrounds, personal interests, passions, and/or values, learners regard the learning as relevant, take ownership of their learning, and are willing to put in the effort needed to learn. When learning activities and assessments are applicable to learners’ lives they become personally meaningful, are viewed as useful, and perceived to have purpose.
 - 15. **Learner socially-culturally connected.** Learning activities and assessments encourage connections between the subject matter and the learner’s social context and lived experience. Social-cultural connections to the subject matter can also address learner diversity and make learning more inclusive.
 - 16. **Learner self-expression.** Learning activities and assessments encourage learners’ self-expression and opportunities to speak their minds. The freedom to share subjective opinions, thoughts, and feelings deepens the connection of newly learned concepts to learners’ prior knowledge and increases ownership of learning as individuals.
 - 17. **Learner creativity.** Learning activities and assessments encourage learners’ creative expression and provide them with the freedom to experiment with ideas and to arrive at novel solutions and insights. The ability for learners to express themselves creatively can contribute to the enjoyment of learning and make learning more engaging. Creative expression further expands learning to go beyond reproducing existing knowledge and encourages knowledge building and the re-interpretation of existing knowledge, processes, and structures.
 - 18. **Learner values.** Learning activities and assessments foster the expression of learners’ subjective attitudes and values in connection to the subject matter in order to strengthen the emotional saliency to the learning goals. Reflecting on values furthermore cultivates the critical literacy required to contemplate a multitude of perspectives.
-

that the design principles *real-world relevance* and *learner relevance* received the highest number of responses by learners.

In Part Two of the study (Reilly & Reeves, 2023), the same design team mapped a framework of 17 higher-order skills and a framework of 10 career competencies to the learning tasks of the same 75 online courses under review and coded the feedback about what helped learners in these online courses foster the higher-order skill they had selected as a result of completing the course. The study identified active learning methods as responsible for deepening engagement while also fostering higher-order competencies. Over 1000 online learners affirmed the theoretical findings of both design-based research studies, namely, that learning tasks that follow the design-principles introduced in this chapter foster engagement and deepen the learning of disciplinary content while fostering higher-order skills.

In the following discussion, we will explore what the expanded set of authentic task principles imply for instructional design practice. To make the individual design principles easier to track, we italicized them to emphasize their pedagogical importance.

IMPLICATIONS FOR A 21ST-CENTURY LEARNING DESIGN

The Learner Is Central

Traditional instructional design (ID) approaches such as ADDIE (Branch & Kopcha, 2014) apply the backwards design approach of declaring disciplinary learning outcomes and then designing learning activities and assessments aligned to meet them. In these models, content is king and the disciplinary learning outcomes are the guiding light. Authentic learning designs, while also setting as their goal the achievement of stated learning outcomes, are guided by the understanding that if engagement and deep learning transfer are to be achieved, then the learners' interactions with the curriculum are central design considerations. In authentic learning designs, the learning experience is king (Clinton & Hokanson, 2012; Hokanson et al., 2015) and the relationships that learners build as a result of these experiences are the guiding light. Relationship building between new and existing knowledge is in the most literal sense what learning is: amino acids aligning to create synaptic relationships that facilitate recall between academic and prior knowledge. This means that how the learner engages with the academic content matters. The more the learner connects their prior knowledge (their culture, their lived experience) to the academic content, the more synapses are developed and strengthened (Reilly, 2020). The more *real-world relevance* and context the learning experience provides (Lave & Wenger, 1991), the more opportunity the learner has to anchor the new information for later recall (Cognition and Technology Group at Vanderbilt, 1990). It follows that an instructional design approach of authentic learning tasks places the learner in the center of design considerations and pays particular attention to contextualizing the learning experience for the learner with the goal to make the course outcomes real-world and/or learner relevant.

Open Inquiry and Knowledge Building

Authentic learning designs (whether within a disciplinary course or across a set of subject matter courses) incorporate open inquiry into the learning experience

so that learners are able to discover for themselves the many relationships that exist for a given academic subject when immersed in a *sustained investigation* over a period of time. It is in the messiness of *ill-structured problems* and open inquiry that the systemic nature and complexity of higher forms of learning, such as the creation of mental models, becomes apparent (Engestrom, 2014). Simply put, an authentic learning design aims for a systems and complexity perspective in which *multiple sources and perspectives* are exposed to build rich connections to the academic knowledge. Moreover, authentic learning tasks, in which the learner is granted *learner agency*, *learner choice*, opportunities for *learner self-expression*, and *learner creativity* increase the learner's ownership of the learning process, which in return helps sustain motivation and engagement while engaging in self-directed inquiry.

The Construction of Knowledge Through Multiple Lenses

Authentic learning designs encourage educators to teach beyond facts – the things of knowledge – and encourages learners to take *multiple sources and perspectives* into consideration, including the (self-)reflection of his/her own perspective. Becoming aware of one's own lens requires opportunities for learners to explore and articulate the subjective realm – their personal thoughts, opinions, feelings, and values – so that these can be socialized with the thoughts, opinions, feelings, and values of their peers, and grow in their perspectives through the exposure of multiple lenses. *Reflection* and *articulation*, two core authentic design principles, are central to developing the complexity perspective. They are also central to facilitating the learning process.

Authentic learning designs support the construction of knowledge through multiple lenses by developing learning activities and assessments that promote meaningful *collaboration* among learners as a means to explore the disciplinary curriculum through the eyes of others. Learning quickly becomes complex when multiple learners take positions on different knowledge paradigms, cultures, or viewpoints. Constructing knowledge through multiple lenses thus requires the collaborative construction of knowledge. Drawing on *multiple sources and perspectives* also implies exposing learners to resources beyond the given set of lectures or chapters of a textbook so that learners can develop the information literacy required to grapple with knowledge paradigms, knowledge claims, authorship, and relevancy to the subject. This supports the eventual understanding that knowledge is shaped by worldviews, lived experience, and interpretation and thus develops the learner into a more self-aware and socially and culturally conscious citizen.

The Learning Environment as an Open System

Authentic learning environments operate as an open system by expanding disciplinary knowledge beyond the classroom into the larger, distributed knowledge production network (Siemens, 2006) where learners can take advantage of the unprecedented interconnectivity of today. Higher education today is no longer the only or even the primary knowledge producer but is part of a vast, distributed knowledge-production network (Gibbons, 1998). What remains unique to the university is the peer-reviewed process that rigorously manages the advancement of knowledge and the alignment between a question and the

method of answering the question. To develop critical thinkers who can navigate this vast, distributed knowledge-production network requires ongoing practice to critically analyze knowledge claims.

How can practitioners (teachers and designers) begin to develop their own approaches to creating authentic learning environments and learning tasks? We will explore this question through the example of a case study.

CASE STUDY: REDESIGN OF AN EXISTING COURSE

Scenario

A higher education health science course has been offered for many years in a traditional lecture room setting to students in various health sciences as a prerequisite for programs such as nursing, public health, medical laboratory science, pharmacy, occupational therapy, food science and nutrition, and physical therapy. The overall course goal is to understand the human body through its various body systems and to explain human disease as an alteration of normal structures and functions within and between these systems. As a foundational science course, the curriculum is dense with foundational medical terminology. The existing learning design consists of weekly quizzes worth 20% of the grade to support the recall of terminology for each body system, two mid-term exams worth 40% of the grade, and a final exam worth 40% of the grade. The end-of-the-semester Student Ratings of Teaching (SRT) responses indicate that a large number of students no longer wish to attend the required face-to-face (F2F) lectures, and the health science department has decided to develop the course for fully online delivery to accommodate students' modality preference and to maintain enrollment.

Design Sprint 1: Identifying a Worthwhile Learning Goal

With the goal to move the course into online delivery, the instructional designer assigned to the course suggests a redesign of the curriculum to increase authenticity. The redesign is described in a series of design sprints. Design sprints are instructional design meetings focused on one or more aspects of the curriculum: learning outcomes, learning resources, learning activities, learning assessments, etc. Design sprints are non-linear, iterative, and collaborative in nature. When aiming for an authentic course, design sprints focus on the creative aspect of instructional design by generating ideas for how to improve the learning experiences according to the design principles introduced earlier. Generally, it is the instructional designer who assumes the creative role of engaging the instructor or content expert in design conversations that generate new ideas during these meetings.

The goal of Design Sprint 1 is to brainstorm and ideate a motivating learning goal that connects the learner to the academic content. Selecting a worthwhile learning goal (worthwhile as perceived by learners) is arguably one of the most important design considerations since it will greatly affect motivation, engagement, and the buy-in required for learners to self-direct a *sustained investigation*. The designer reviews the learning goals and considers how the existing course outcomes lend themselves to an inquiry-based, problem-based, or design-based approach.

Questions that help generate ideas are:

- Where/how do the course-level outcomes have *real-world relevance*?
- What learning tasks would make these learning outcomes *learner relevant*?
- How can course-level outcomes be framed around an *ill-structured problem* that learners can investigate in a *sustained investigation*?

In order to arrive at a worthwhile *sustained investigation*, it is important to consider who the learners are, what they already know about a subject, and what they might be curious about. The designer contemplates the following questions:

- Who are the learners? What perspectives do they bring?
- What do learners already know about the subject?
- How can I assess the learners' prior knowledge and skills on the topic?
- Why should learners care about this subject/problem?
- What might interest them about this subject?
- How can I incorporate what the learners know (their prior experience and existing funds of knowledge) as a valued learning resource?
- How might learning tasks need to change for learners with differing sets of prior skills and knowledge?
- Does this subject/problem represent the worldview of the learner?

Because this health science course is a prerequisite for multiple academic programs (nursing, public health, medical laboratory science, pharmacy, occupational therapy, food science and nutrition, physical therapy, etc.), it brings together learners from different backgrounds and different interests. To provide the course outcomes with *learner relevance* for such a diverse audience, the designer suggests that learners investigate a disease of choice as long as the disease affects multiple body systems. The design principle *learner choice* instantly personalizes the curriculum, because it frames learners as co-creators of the curriculum who will contribute their own unique approaches, prior knowledge, and interests to the subject-matter inquiry. Perhaps learners choose to investigate an illness that they themselves or a family member is confronting, or they investigate a disease paramount in the medical field in which the learner is planning to major. *Learner choice* also opens up the curriculum to a variety of sociocultural perspectives and thus provides the curriculum with more *learner social-cultural connectedness*.

Design Sprint 2: Designing a Sustained Investigation

The goal of Design Sprint 2 is to design a learner-led investigation. Inspired by the course outcome to “Correlate the concepts and underlying general pathology with specific diseases in/between different body systems,” the designer and content expert explore the idea of designing a Disease Narrative Project in which learners investigate the possible causes and progression of the disease for a fictitious patient. Learners will generate questions that will drive their inquiry into the progression (healing or worsening) of the patient's condition depending upon multiple branching points along the disease narrative. The *sustained investigation* into a specific disease will run the entire length of the semester parallel to the course lectures. It will require *learner agency* to explore lecture material relevant to the disease across multiple body systems as well as independent research to support the evolving narrative. The inquiry-based

project will replace the two midterm exams previously worth 40% of the grade. The final exam will be turned into an open book examination.

Next the designer and content expert contemplate how to scaffold the open inquiry of the Disease Narrative Project over the length of the semester through the following questions:

- How long is the unit of study?
- How can the open inquiry be scaffolded throughout the unit of study?
- What diagnostic and formative activities will scaffold and sustain the investigation?

They arrive at the following project scaffolds: You are studying to become a medical professional and have a friend or family member recently diagnosed with a disease/medical condition. You want to understand their disease from a scientific perspective in order to communicate about the disease with other medical professionals as well as with your friend and/or family. This requires you to create two narratives.

- An *expert version* that a medical professional would use to explain the disease and its progression in clinical language to a colleague using the medical terminology learned in the course.
- A *non-expert version* that a medical professional would use to explain the progression of the disease to a patient or their family in layman's terms. This requires you to "translate" medical vocabulary into descriptive, everyday language. This narrative should demonstrate your deep understanding of the medical terminology and connections among body systems.

Learners will be building two narratives. Each narrative will consist of a sequence of "passages" telling the story of the disease. Each passage describes a biological event that leads to alterations of normal structures and functions within the body. Together, these passages connect to show a possible sequence of events, indicating how a change in one system or organ affects another during the recovery or progression of the disease. Some passages will be "branching points" where the reader must choose from multiple options to continue the narrative. Their choice determines which narrative they follow. Branching points may describe one of the following:

- Medical interventions: medications, therapies, surgeries, etc.
- Environmental factors that may alter the course of the disease: smoking, exposure to sun or chemicals, diet, social support, access to healthcare, etc.
- Individual anatomical, genetic, or physiological factors that affect the course of the disease
- Probabilistic (chance) factors that may alter the course of the disease: timing of discovery of disease, speed of progression, etc.

The content expert and instructional designer are pleased with their creative idea of the Disease Narrative inquiry because the project not only addresses each of the stated course outcomes, it exceeds them.

Design Sprint 3: Designing for the Collaborative Construction of Knowledge

The goal of Design Sprint 3 is to consider the social nature of learning. Rather than asking learners to work individually, the designer suggests creating the

Disease Narrative as a group project in which individual students can dive into different aspects of the research. Moreover, through *collaboration*, learners can bring their own backgrounds and perspectives to bear on the project. One group, for example, might explore health outcomes through the *interdisciplinary perspectives* of culture and medicine by incorporating cultural perspectives into their disease narrative. Another group might explore the intersection of psychology and pathology after discovering statistical correlations between trauma and autoimmune disease in their independent research. Yet another group might explore the intersection of poverty, race, and health outcomes for African Americans with asthma in their disease narrative. These additional *interdisciplinary perspectives* were not predetermined course outcomes but are achieved exclusively through the design principles of *learner agency*, *learner relevance*, *learner choice*, and *collaboration*. To scaffold the collaborative inquiry, the instructional designer develops several support documents to guide individual and collective groups' efforts:

- A Narrative Planning Document
- A Narrative Map
- A Narrative Effort Log
- A Team Organization Report Document

Design Sprint 4: Designing a Performance Assessment

The goal of Design Sprint 4 is to explore how learners will demonstrate their understanding in a *polished product*. The instructional designer suggests that learners develop their Disease Narrative using Twine2, an open-source software that allows users to create a “choose your own adventure” interactive story. The performance assessment will undergo a peer review before being evaluated by the instructor. The peer review requires learners to review the course lecture materials in order to provide valuable feedback to their peers. This way, the design principles *reflection* and *articulation* are naturally woven into the learning design. Finally, both peer review and final evaluation will use a multipoint rubric to guide learners as to what is expected of them. The final learning product – a completed Disease Narrative Project – that audiences can interact with using the Twine2 software, creates a unique *polished product* for each group. Which disease groups investigate, which therapies they research, and which correlating causes they identify all depend on the research driven by the learners. Their projects draw on course materials as well as on vetted sources from the Internet. As learners present their final projects to each other at the end of the semester, no single project is alike. Because the Disease Narrative Project encourages *learner choice*, the application of unique approaches results in *multiple interpretations and outcomes* on the same topic.

Design Sprint 5: Expanding the Learning Resources Beyond Provided Course Materials

The goal of Design Sprint 5 is to open the learning to the distributed knowledge system. Together, the designer and content expert decide to keep the weekly lectures organized around body systems as the primary learning resource, but to record them professionally in the studio so that learners can both listen to and

view them in a playlist. Moreover, the lectures are made interactive through a cloud-based video annotation software that allows learners to bookmark sections of the video lecture and make annotations when a particular section relates to the disease narrative. While the online lectures provide the disciplinary perspective, the independent research by learners adds additional *interdisciplinary perspectives*, some of which are oriented by different knowledge paradigms. Because the additional learning resources need to be vetted for reliability, the project now fosters information and ICT literacy in the process.

DISCUSSION

The original learning design composed of weekly lectures, quizzes, and exams lacked opportunities for intellectual curiosity and learner motivation that would have resulted in a failure to engage learners. Moreover, without any opportunity to anchor the academic knowledge in real-world or personally relevant contexts, and without any opportunity for learners to collaborate and at least to some extent drive their own learning on the subject; the original learning design was not grounded in learning sciences research about the constructive, situated, self-regulated, and collaborative nature of learning (Benavides et al., 2010).

Active Learning (AL) Course Review

When reviewing the original learning design against the design principles introduced in this chapter, the course would have received an active learning (AL) score of zero. The redesign of the health science course resulted in a more authentic learning experience even though learners were still held accountable to the same disciplinary course outcomes. Using the rubric tool (Reilly & Reeves, 2022) in which each of the design principles is evaluated on a four-point scale – Absent (0), Underemphasized (1), Emphasized (2), Maximized (3) – the new learning design now scores 38/54 on the following design principles (see Table 14.3).

The new learning design maximized the authentic task principles *ill-defined problem*, *sustained investigation*, *collaboration*, and *articulation*, because the semester-long Disease Narrative Project required groups of learners to research the causes and progression of a disease through multiple body systems and articulate the research findings with branching points in both professional and layman's terms. The final learning product, an interactive website telling the story of the disease narrative with branching points that viewers can interact with, also maximized the design principles *integrated assessment*, *polished product*, and *multiple interpretations and outcomes* since each group creates a unique learning product.

Conceptually, the new learning design has moved the clinical in-vitro (theoretical) knowledge of medical terminology into an in-vivo (real-life) context where the disease is subject to a complex array of sociocultural factors, such as considering environmental conditions, interdisciplinary treatment options, and cultural perspectives on healing, when researching different branches of the disease narrative. The new learning design also maximized the design principle *multiple sources and perspectives* because the project expanded the learning resources beyond the given course lectures and required learners to find, vet, and incorporate medical information from the vast, distributed knowledge-production

TABLE 14.3 Case Study: Active Learning (AL) Course Review

Authentic Task Principles	Points
Real-world relevance	1
Ill-defined problem	3
Sustained investigation	3
Interdisciplinary perspectives	2
Collaboration	3
Reflection	1
Articulation	3
Integrated assessment	3
Polished product	3
Multiple interpretations and outcomes	3
Multiple sources and perspectives	3
Learner relevance	3
Learner choice	3
Learner agency	3
Learner socially-culturally connected	1
Learner self-expression	0
Learner creativity	0
Learner attitudes and values	0
Total AL score	38/54

network, including the knowledge and perspective of the group members contributing to the narrative. Finally, the new learning design maximized the learner-centered principles *learner relevance*, *learner choice*, *learner agency* due to the fact that learners were given the opportunity to choose a topic of relevance to them while carrying the responsibility of driving their own learning.

While it is not the goal to maximize each individual design principle, when contemplating design options, considering the degree to which multiple design principles are simultaneously optimized can help guide decisions about which conceptual learning design may end up being adopted and advanced into development. Conducting a before and after active learning course review (Reilly & Reeves, 2022) may convince a content expert or administrator to adopt a particular learning design given the improved active learning (AL) score a particular learning design receives.

21st-Century Learning Design

In its original state, the course provided inadequate higher-order learning, underdeveloped creativity, and as such offered little preparation for real-world performances. The course lacked the capacity to foster the higher-order skills required in a knowledge society. The new learning design led by one instructional designer addressed each of these design flaws. The creative redesign provided learners with an academically complex task worthy of productive

struggle. Through collaboration, it provided learners with the opportunity for social connection, which develops a belonging mindset. The new learning design supported deep learning transfer because learning is enhanced when learners develop cognitive, social, and emotional capabilities simultaneously. Finally, it provided learners with an authentic opportunity to demonstrate what they have learned in a final product that incorporates academic content while fostering transferable skills. Specifically, the Disease Narrative Project offered the opportunity to practice important 21st-century learning skills, including working creatively with others, engaging in critical thinking, practicing communication and collaboration skills, and improving information literacy, media literacy, and ICT literacy, all within the same project.

Learning Outcomes Mapping

When applying the outcomes protocol introduced in this chapter (Reilly & Reeves, 2023) to map the curriculum for higher-order skills, the outcomes table clearly evidences that the Disease Narrative Project allowed learners

TABLE 14.4 Case Study: Learning Outcomes Table

Learning Activities and Assessments	AL: 38/54		Learning Outcomes	
	Individual/Group	% Grade	CO	T-skills
Disease Narrative Project	Individual	40%	CO1 CO2 CO3 CO4 CO5	A1: Work creatively with others A2: Critical thinking and problem solving A3: Communication A4: Collaboration B1: Information literacy B2: Media literacy B3: ICT literacy C4: Health literacy
Final exam	Individual	30%	CO1 CO2 CO3 CO4 CO5	C4: Health literacy
Quizlet @ 5 pts/ea	Group	15%	CO1 CO2 CO3 CO4 CO5	A4: Collaboration C4: Health literacy
VideoAnt lectures @ 5 pts/ea	Group	15%	CO1 CO2 CO3 CO4 CO5	A4: Collaboration C4: Health literacy
Total = 220 pts		100%		

to practice all five course outcomes while simultaneously fostering multiple transferable skills in the process (see Table 14.4). This type of visual evidence can inform designers, instructors, and administrators of the potential learning outcomes fostered by a particular learning design.

CONCLUSION

While the design principles are evidence-based and support what is known about the constructive, situated, self-directed, and collaborative nature of learning (Benavides et al., 2010; Bransford et al., 2000, Reilly & Reeves, 2022), there is no right or wrong way to design authentic learning experiences. Each disciplinary curriculum has its own window of opportunity to incorporate an authentic learning approach. The health science course that served as a case study to illustrate the design principles could have been redesigned in a multitude of other ways. The flexible and creative application of the design principles and the creative and bespoke solutions that are possible are what makes authentic learning future facing, future relevant, and future proof. Authentic eLearning that follows the expanded set of design principles offers the type of personalized learning that adaptive platforms are not able to deliver – at least not yet. Authentic learning personalizes the curriculum by making the academic content cognitively real to the learner by supporting *learner relevance* and *real-world relevance* between the academic content and the learners' inner and outer world. As the word design implies a creative process, for instructional designers the expanded set of authentic task principles activate what is core to the profession: the creative design of a curriculum for local conditions (Henriksen, 2016). The rewards of authentic learning experiences are found when learners deeply engage in learning and in return creatively contribute and reinterpret the curriculum through their unique learning products.

Summary of Key Principles

1. **“Keep it real” is more than just a slogan.** It should serve as a reminder of the importance of infusing the design of learning environments with authentic tasks whenever possible. Realism rests more in the mind of the learner than in the media incorporated into the learning environment. Cognitive realism is more important than the physical or virtual fidelity of a learning simulation or serious game.
2. **Authentic tasks require more time and dedication than traditional academic learning environments.** Time on task is critical to learning because, despite what some pundits have claimed, learning is not easy or automatic. Meaningful learning requires commitment and effort. But if the tasks are truly authentic, most learners will be willing to invest the necessary level of effort.
3. **Assessment should be such a well-integrated part of the learning environment that learners perceive very little difference between when they are learning and when their work is being assessed.** Ensure that the learning task produces a professional

product that is valuable in its own right and that can be shared.

4. **Authentic tasks have a focus that is inquiry-driven rather than purely disciplinary-driven.** They explore the many relationships that subject matter holds when reconnected with the real world or with the learners' subjective experience. Through the exploration of these relationships, authentic tasks naturally support an interdisciplinary, systems, or complexity perspective.
5. **Authentic tasks place the learner central to design considerations.** They aim to make the learning

experience *learner relevant* by tapping into the learners' interests, values, prior knowledge, and culture. Frequently, this is facilitated through aspects of *learner choice*.

6. **Authentic learning tasks consider the learner as a co-producer rather than passive consumer of knowledge.** Rather than setting as the learning goal the mere reproduction of existing knowledge, authentic learning tasks elevate learning to higher levels by requiring the learner to apply existing knowledge to worthwhile learning goals.

Application Questions

1. Universities and colleges are scrambling to understand how to adapt their educational programs and courses to the increasing capabilities of generative artificial intelligence (AI) programs such as ChatGPT. Assume the role of a learning designer assigned to a taskforce of interdisciplinary faculty charged with developing a one-credit-hour introductory course that all beginning students will complete online during the month before initial enrollment to learn the ethical uses and misuses of generative AI. Prepare a preliminary design document that describes how the design principles of the expanded model of authentic learning described in this chapter could be applied in this course so that students develop the cognitive, affective, and conative skills required for the ethical use of generative AI in their studies.
2. The recidivism rate in America's prisons is unacceptably high, with more than 70% of released prisoners imprisoned for new crimes

within five years of release. A major contributor to the high recidivism rate is the lack of preparation for reentry into society of most inmates. Many parolees lack basic literacy skills, marketable job skills, and the attitudes and intentions required for even minimum wage jobs. Imagine that you work for an eLearning startup that is applying for a multi-million-dollar grant from the U.S. Department of Justice to develop educational programming for inmates with less than 18 months of time left on their sentences that will enhance core literacy competencies, provide key skills for entry-level positions in hospitality such as hotels and restaurants, and encourage the development of desirable work habits (e.g., showing up on time, exhibiting on-task behaviors, and the capacity to receive feedback concerning the need for improving job performance). How would you use the authentic learning design principles described in this chapter to prepare a high-level design plan

- for inclusion in your company's application for this grant?
3. The learning losses that resulted when K–12 teachers and students were forced into remote learning in the wake of the pandemic continue to compound years later. As a result, many, perhaps most, teachers have grown skeptical about the effectiveness of online learning. To address this problem, your state's Department of Education (DOE) wishes to provide teachers with exemplary online learning environments that will showcase the power of eLearning environments that

adhere to the authentic learning design principles described in this chapter. The DOE wants to have three such courses developed: one focused on learning theory, another about alternative pedagogical models, and the third on the process of learning design itself. Choose one of these topics and prepare a Request for Proposal (RFP) for the development of one of these new courses with sufficient detail that will encourage non-profit and for-profit agencies to apply to design and develop these innovative online courses.

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SECTION **IV**

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Evaluation and Analytics



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Evaluation in Instructional Design

A Comparison of the Major Evaluation Models

R. Burke Johnson and James P. Van Haneghan

One of the fundamental components of instructional design is evaluation. Evaluation is not only important in examining the outcomes of instructional design or human performance interventions, but is also key to analysis, design, and development phases. The purpose of this chapter is to describe several useful evaluation models.

Because of the prominence of Scriven's work in evaluation, we will use his popular definition to provide an overall definition of evaluation. According to Scriven (1991) "Evaluation is the process of determining the merit, worth, and value of things, and evaluations are the products of that process" (p. 139). By *merit* Scriven refers to the "intrinsic value" of the evaluation object or *evaluand*. By *worth* Scriven is referring to the "market value" of the evaluand or its value to a stakeholder, an organization, or some other collective. By *value* Scriven has in mind the idea that evaluation always involves the making of evaluative judgments.

For example, one could judge an instructional program by examining whether it is based on evidence-based principles and effectively increases learning. It may have merit as a learning tool; however, it might have worth to an organization only if it helps to improve productivity and profitability. Only in the latter case might it have value to the organization.

Scriven (1980) also provides a "logic of evaluation" that includes four steps. First, select the criteria of merit or worth. Second, set specific performance standards for your criteria. Third, collect performance data and compare the level of observed performance with the level of required performance dictated by the performance standards. Fourth, make the evaluative judgment(s). In short, evaluation is about identifying criteria of merit and worth, setting standards, collecting data, and making value judgments.

In 1967 Scriven coined the terms *formative* and *summative* evaluation. These concepts are still used today. Here are Scriven's (1991) definitions of formative and summative evaluation:

Formative evaluation is evaluation designed, done, and intended to support the process of improvement, and normally commissioned or done by, and delivered to, someone who can make improvements. *Summative evaluation* is the rest of evaluation: in terms of intentions, it is evaluation done for, or by, any observers or decision makers (by contrast with developers) who need evaluative conclusions for any reasons besides development.

(p. 20, emphasis in original)

Thus not only do evaluation models address outcomes, they also address the iterations of analysis and formative testing as instructional or human performance interventions are developed.

The evaluation processes described in early instructional design models incorporated summative and formative aspects of evaluation. Testing focuses on the objectives stated for the instruction. This is referred to as *criterion-referenced* (or *objective-referenced*) testing. The purpose of testing is not to assign grades, but rather to determine if each instructional objective has been mastered. A summative assessment, be it multiple-choice, essay, or products developed by the learners, should require learners to demonstrate the skills defined by the instructional objectives.

The second feature is a focus on the learners as the primary source of data for making decisions about the instruction. That means including them as well as other stakeholders in the instruction as part of the formative evaluation. Subject matter experts (SMEs) on instructional design teams help check the validity of content, but their knowledge of which instructional strategies will be effective varies. Formative evaluation in instructional design focuses on learners' ability to learn from the instruction, and to enjoy it is crucial.

THE MAJOR EVALUATION MODELS

Many evaluation models were developed in the 1970s and 1980s. These evaluation models had a profound impact on how designers would come to use the evaluation process. The models were used on projects that included extensive development work, multiple organizations and agencies, and multiple forms of instructional delivery. These projects tended to have large budgets and many staff members, and multiple goals to be achieved over time. Examples were teacher corps projects aimed at reforming teacher education and math projects that attempted to redefine how children learned mathematics. Because of their complexity, these projects often required "new" models of evaluation to adequately capture their impact. One model developed to address these complex interventions was the CIPP model developed by Stufflebeam (1971).

Stufflebeam's CIPP Evaluation Model

The CIPP acronym stands for Context, Input, Process, and Product. These are four distinct types of evaluation, and they all can be done in a single comprehensive evaluation, or a single type can be done as a stand-alone evaluation.

Context evaluation is the assessment of the environment in which an innovation/program will be used to determine the need and objectives for the innovation and to identify the factors in the environment that will impact its success. This analysis is frequently called a *needs assessment*, and it is used in making *program planning decisions*. According to Stufflebeam's CIPP model, the evaluator should be present from the beginning of the project and assist in the conduct of the needs assessment.

The second step or component of the CIPP model is *input evaluation*. Here, evaluation questions are raised about the resources that will be used to develop and conduct the innovation/program. What people, funds, space, and equipment will be available for the project? Will these be sufficient to produce the desired results? Is the conceptualization of the program adequate? Will the program design produce the desired outcomes? Are the program benefits expected to outweigh the costs? This type of evaluation is helpful in making *program structuring decisions*.

The third component of CIPP is *process evaluation*. This corresponds closely to *formative evaluation*. Process evaluation is used to examine the ways in which an innovation/program is being developed, the way it is implemented, the initial effectiveness, and the effectiveness after revisions. Data are collected to inform the project leader (and other program personnel) about the status of the project, how it is implemented, whether it meets legal and conceptual guidelines, and how the innovation is revised to meet the implementation objectives. Process evaluation is used to make *implementation decisions*.

The fourth component of CIPP is *product evaluation*, which focuses on the success of the innovation/program in producing the desired outcomes. Product evaluation includes measuring the outcome variables specified in the program objectives, identifying unintended outcomes, assessing program merit, and conducting cost analyses. Product evaluation is useful in making *summative evaluation decisions* (e.g., What is the overall merit and worth of the program? Should it be continued?).

Introduction of the CIPP model to instructional design changed the involvement of the evaluator in the development process. The evaluator became a member of the project team. Furthermore, evaluation was no longer something that just happened at the end of a project, but became a formal process continuing throughout the life of a project.¹

Rossi's Five-Domain Evaluation Model

Starting in the late 1970s and continuing to today, Peter Rossi and his colleagues developed a useful evaluation model (Rossi et al., 2004). According to this model, each evaluation should be tailored to fit local needs, resources, and types of programs. This includes tailoring the evaluation questions (What is the evaluation purpose? What specifically needs to be evaluated?), methods and procedures (selecting those that balance feasibility and rigor), and the nature of the evaluator-stakeholder relationship (Who should be involved?

1 The CIPP model continues to be a popular evaluation model today. For more information about this model (including updates), as well as some of the other models discussed here, go to the Evaluation Center website at Western Michigan University: www.wmich.edu/evaluation/checklists.

What level of participation is desired? Should an internal or an external/independent evaluator be used?). For Rossi, the evaluation questions constitute the core, from which the rest of the evaluation evolves. Therefore, it is essential that you and the key stakeholders construct a clear and agreed-upon set of evaluation questions.

The Rossi model emphasizes five primary evaluation domains. Any or all domains can be conducted in an evaluation. First is a *needs assessment*, which addresses this question: Is there a need for this type of program in this context? A *need* is the gap between the actual and desired state of affairs. Second is *program theory assessment*, which addresses this question: Is the program conceptualized in a way that it should work? It is the evaluator's job to help the client explicate the theory (how and why the program operates and produces the desired outcomes) if it is not currently documented. If a program is not based on sound social, psychological, and educational theory, it cannot be expected to work – this problem is called *theory failure*. Third is *implementation assessment*, which addresses this question: Was this program implemented properly and according to the program manual? If a program is not properly operated and delivered, it can't succeed – this problem is called *implementation failure*. The fourth domain, *impact assessment*, addresses this question: Did this program have an impact on its intended targets? This is the question of cause and effect, reflecting a social science approach. To establish cause and effect, a strong experimental research design should be used (if possible). The fifth domain (addressing an economic approach), *efficiency assessment*, addresses this question: Is the program cost effective? It is possible that a particular program has an impact but is *not* cost effective. For example, the return on investment might be negative, costs might outweigh the benefits, or the program might not be as efficient as others. The efficiency ratios used in these types of analyses are explained in a footnote.² Because of the importance of *program theory* we next discuss Chen's theory-driven evaluation.

Chen's Theory-Driven Evaluation Model

Theory-driven evaluation (TDE) is an evaluation approach where evaluators and stakeholders focus on how and why an intervention/program works (Chen, 2015). The TD evaluator helps articulate, evaluate, and improve the *program theory*, which is the stakeholders' implicit and explicit assumptions about how a program responds to a problem and the actions required to solve

2 In business, financial results are often measured using the *return on investment* (ROI) index. ROI is calculated by subtracting total dollar costs associated with the program from total dollar benefits (this difference is called *net benefits*) then dividing the difference by total dollar costs and multiplying the result by 100. A ROI value greater than zero indicates a positive return on investment. A *cost-benefit analysis* is commonly used with governmental programs; this relies on the *benefit-cost ratio*, which is calculated by dividing total dollar benefits by total dollar costs. A benefit-cost ratio of 1 is the break-even point, and values greater than 1 mean the benefits are greater than the costs. Because it can be difficult to translate benefits resulting from training and other interventions into dollar units (e.g., attitudes, satisfaction), *cost-effectiveness analysis* is often used rather than cost-benefit analysis. To calculate the *cost-effectiveness ratio* the evaluator translates training program costs into dollar units but leaves the measured benefits in their original (non-dollar) units. A cost-effectiveness ratio tells you how much "bang for the buck" your training provides (e.g., how much improvement in job satisfaction is gained per dollar spent on training).

it (Chen, 2015). An advantage of theory-driven evaluation is that it uncovers and articulates the areas that “black-box evaluation” (which focuses only on desired outcomes and not the processes between input and output) and “method-driven evaluation” (which emphasizes prioritized research methods and focuses only on impact) do not.

The paradigmatic TDE program theory schema is shown in Figure 15.1. A program theory includes an action model and a change model. The program theory is used to drive the theory-driven approach for program planning and evaluation (Chen, 2015). An *action model* is the program’s systematic plan for organizing resources, settings, staff, and support organizations to deliver intervention services and to reach the target population. An action model includes the following: (a) intervention and service delivery protocols (which details an intervention’s operating procedures and perspective and includes the steps needed to deliver the intervention in the field); (b) implementing organization(s) (i.e., the organization(s) that allocates resources, recruits, supervises, and trains implementers and coordinates activities); (c) implementers (i.e., the people who deliver services to clients); (d) associated organizations and community partners (i.e., interested inter-organizational stakeholders to establish collaboration between community partners and associate organizations); (e) ecological context (i.e., the segment of the environment that interacts directly with the program); and (f) the target population (i.e., the group of people receiving the intended services) (Chen, 2015). The action model includes a lot of useful information and is an important tool during the planning and conduct of a TDE.

The *change model* is the program’s description of the causal processes and outcomes required to resolve the identified problem(s). A change model includes three major elements: (a) the intervention (i.e., activity aimed directly at changing a problem); (b) causal determinants (i.e., causes of the problem or leverages, moderator variables, and intervening variables); and (c) program outcomes (i.e., changes on targeted proximal- and distal-dependent variables) (Chen, 2015). As shown in Figure 15.1, appropriate implementation of the components of the action model is critical for the change model’s transformation process to be activated (Chen, 2015). (Figure 15.2 provided to B. Johnson by H. Chen, August 13, 2015.)

Kirkpatrick’s Training Evaluation Model

Kirkpatrick’s model was published initially in four articles in 1959 and is still frequently used today.³ Kirkpatrick specifically developed his model for *training* evaluation. What he originally referred to as *steps* later became the *four levels* of evaluation. Evaluators might only conduct evaluations at the early steps, or they might evaluate at all four levels. The early levels of evaluation are useful by themselves, and they are useful in helping one interpret evaluation results from the higher levels. For example, one reason transfer of training (level 3) might not take place is because learning (level 2) never took place; likewise, satisfaction (level 1) is often required if learning (level 2) and other results (levels 3 and 4) are to occur.

³ For more information on the Kirkpatrick model, go to www.kirkpatrickpartners.com/the-kirkpatrick-model/.

FIGURE 15.1 TDE program theory schema, including action model and change model

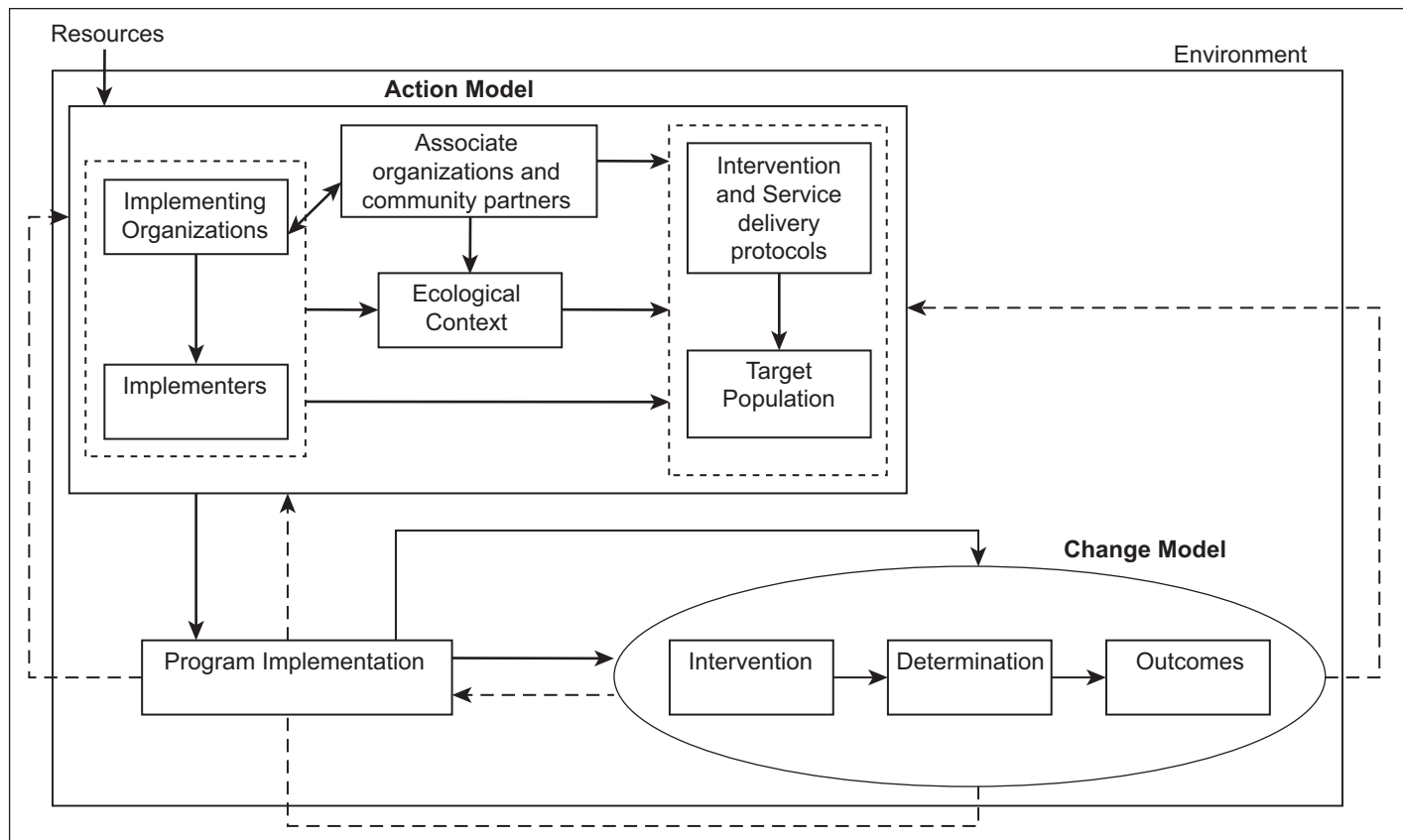
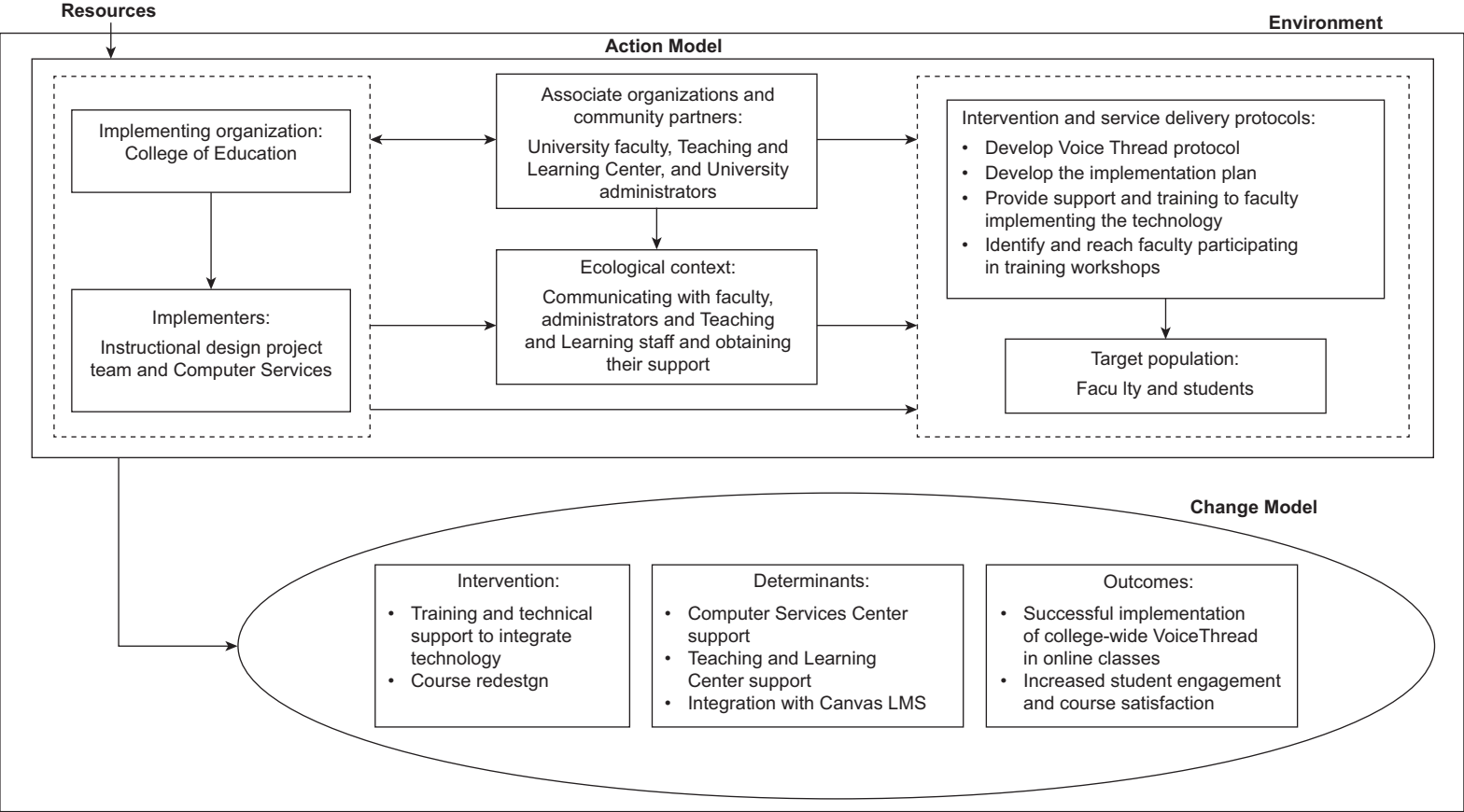


FIGURE 15.2 Program theory of VoiceThread software implementation



LEVEL 1: REACTION Kirkpatrick’s first level is the assessment of learners’ reactions or attitudes toward the learning experience. Anonymous questionnaires should be used to get honest reactions from learners about the training. These reactions, along with those of the training director, are used to evaluate the instruction but should not serve as the only type of evaluation. It is generally assumed that if learners do not like the instruction it is unlikely they will learn from it.

Although level 1 evaluation is used to study the reactions of participants in training programs, it is important to understand that data can be collected on more than just a single *overall* reaction (e.g., “How satisfied were you with the training event?”). Detailed level 1 information should also be collected about training components and experiences (e.g., the instructor, the topics, the presentation style, perceived engagement, the schedule, the facility, the learning activities, and how engaged participants felt). We recommend also including open-ended items (i.e., where respondents respond in their own words): “What do you believe are the three most important strengths of the training program?” and “What do you believe are the three most important weaknesses of the training program?” It is usually best to use a mixture of open-ended items (such as the two questions just provided) and closed-ended items (such as providing a statement or item stem such as “The material covered in the program was relevant to my job” and asking respondents to use a four-point rating scale such as: very dissatisfied, dissatisfied, satisfied, very satisfied).⁴ The research design typically used for level 1 evaluation is the one-group posttest-only design (Table 15.1).

LEVEL 2: LEARNING In level 2 evaluation, the goal is to determine what the participants in the training program learned as well as their confidence that they can use it later and their commitment to use it later. By *learning* Kirkpatrick

TABLE 15.1 Research Designs Commonly Used in Training Evaluation

Design	Design			Design
Strength	Depiction			Name
1. Very weak	X	O ₂		One-group posttest-only design
2. Moderately weak	O ₁	X	O ₂	One-group pretest-posttest design
3. Moderately strong	O ₁	X	O ₂	Nonequivalent comparison-group design
		O ₁	O ₂	
4. Very strong	RA	O ₁	X O ₂	Pretest-posttest control-group design
	RA	O ₁	O ₂	

*Note that X stands for the treatment (i.e., the training event), O₁ stands for pretest measurement, O₂ stands for posttest measurement, and RA stands for random assignment of participants to the groups. Design 3 has a control group, but the participants are not randomly assigned to the groups; therefore, the groups are to a greater or lesser degree “nonequivalent.” Design 4 has random assignment and is the gold standard for providing evidence for cause and effect. For more information on these and other research designs, see Johnson and Christensen (2020).

4 Kirkpatrick (2006) provides several examples of questionnaires that you can use or modify for your evaluations.

(2006) has in mind “the extent to which participants change attitudes, improve knowledge, and/or increase skill as a result of attending the program” (p. 20). Training events will be focused on creating a combination of *knowledge* (“I know it”), *skills* (“I can do it”), *attitudes* (“I believe this will be worthwhile to do on the job”), *confidence* (“I think I can use it in my job”), and *commitment* (“I intend to use it later in my job”).

In addition, level 2 evaluation should always include measurement of what specifically was covered in the training event and listed on the learning objectives. The tests should cover the material that was presented to the learners in order to have a valid measure of the amount of learning that has taken place. Knowledge is typically measured with an *achievement test* (i.e., a test designed to measure the degree of knowledge learning that has taken place after a person has been exposed to a specific learning experience); skills are typically measured with a *performance test* (i.e., a testing situation where test takers demonstrate some real-life behavior such as creating a product or performing a process); and attitudes and perceptions are typically measured with a *questionnaire* (i.e., a self-report data-collection instrument filled out by research participants designed to measure, in this case, the attitudes targeted for change in the training event).

The one-group pretest-posttest design is often sufficient for a level 2 evaluation. As you can see in Table 15.1, this research design involves a pretest and posttest measurement of the training group participants on the outcome(s) of interest. The estimate of learning improvement is the difference between the pretest and posttest scores. Kirkpatrick appropriately recommends that a control group also be used when possible in level 2 evaluation because it allows stronger inferences about causation. This typically means that you will use the nonequivalent comparison-group design shown in Table 15.1 to demonstrate that learning has occurred as a result of the instruction. Learning data are not only helpful for documenting learning; they are also helpful to training directors in justifying their training function in their organizations.

LEVEL 3: BEHAVIOR (TRANSFER OF TRAINING) Here the evaluator’s goal is to determine whether the training program participants change their on-the-job behavior (OBJ) as a result of the training program. Learning in the classroom or other training setting is no guarantee that a person will demonstrate those same skills in a real-world setting. The training director should conduct a follow-up evaluation several months after the training to determine whether the knowledge, attitudes, and skills learned are being used on the job.

Kirkpatrick (2006) identifies five environments that affect transfer of training: (a) preventing environments (e.g., where the trainee’s supervisor does not allow the trainee to use the new knowledge, attitudes, or skills); (b) discouraging environments (e.g., where the supervisor discourages use of the new knowledge, attitudes, or skills); (c) neutral environments (e.g., where the supervisor does not acknowledge that the training ever took place); (d) encouraging environments (e.g., where the supervisor encourages the trainee to use new knowledge, attitudes, and skills on the job); and (e) requiring environments (e.g., where the supervisor monitors and requires use of the new knowledge, attitudes, and skills in the work environment).

To determine whether the knowledge, skills, and attitudes are being used effectively on the job, it is necessary to contact the learners and their supervisors, peers, and subordinates. Kirkpatrick oftentimes seems satisfied with the use of what we call a *retrospective survey design* (asking questions about the past in relation to the present) to measure transfer of training. A retrospective survey involves interviewing or having trainees and their supervisors, peers, and subordinates fill out questionnaires several weeks and months after the training event to measure their perceptions about whether the trainees are applying what they learned. To provide a more objective indication of transfer to the workplace, Kirkpatrick suggests using designs 2, 3, or 4 (shown in Table 15.1). Level 3 evaluation is usually more difficult to conduct than lower-level evaluations, but the resulting information is important to decision makers. If no transfer takes place then one cannot expect to have level 4 outcomes, which is the original reason for conducting the training.

LEVEL 4: RESULTS Here the evaluator's goal is to find out if the training leads to "final results." Level 4 outcomes include any leading indicators and outcomes that affect the performance of the organization. Some desired organizational, financial, and employee results include reduced costs, higher quality of work, increased production, lower rates of employee turnover, lower absenteeism, fewer wasted resources, improved quality of work life, improved human relations, improved organizational communication, increased sales, fewer grievances, higher worker morale, fewer accidents, increased job satisfaction, and importantly, increased profits.

Kirkpatrick acknowledges the difficulty of validating the relationship between training and level 4 outcomes. Because so many extraneous factors other than the training can influence level 4 outcomes, stronger research designs are needed (see designs 3 and 4 in Table 15.1). Unfortunately, implementation of these designs can be difficult and expensive. Nonetheless, it was Kirkpatrick's hope that training directors would attempt to conduct sound level 4 evaluations.

Brinkerhoff's Success Case Method

The next evaluation model is more specialized than the previous models. It focuses on finding out what about a training or other organizational intervention *worked*. According to its founder, Robert Brinkerhoff, the Success Case Method (SCM) "is a quick and simple process that combines analysis of extreme groups with case study and storytelling . . . to find out how well some organizational initiative (e.g., a training program, a new work method) is working" (Brinkerhoff, 2005, p. 401). The SCM uses the common-sense idea that an effective way to determine "what works" is to examine successful cases and compare them to other cases. The SCM recognizes the organizational embeddedness of programs and seeks to explicate personal and contextual factors that differentiate effective from ineffective program use and results. The SCM is popular in human performance improvement (HPI) because it works well with training and non-training interventions (Surry & Stanfield, 2008).

The SCM follows five steps (Brinkerhoff, 2003). First, you (the evaluator) focus and plan the Success Case study. You must identify and work with stakeholders to define the program to be evaluated, explicate its purpose, and

discuss the nature of the SC approach to evaluation. You must work with stakeholders to determine their interests and concerns, obtain agreement on the design of the project, the budget, and the time frame for the study.

Second, construct a visual *impact model*. This includes explicating the major program goals and listing all impacts/outcomes that are hoped for or are expected to result from the program. The far-left side of a typical depiction of an impact model lists “capabilities” (e.g., knowledge and skills that should be provided by the program); these are similar to Kirkpatrick’s level 2 learning outcomes. The far right depicts “business goals” that are expected to result from the program; these are similar to Kirkpatrick’s level 4 results outcomes. The middle columns of a typical impact model include behaviors and organizational and environmental conditions that must be present to achieve the desired business goals. These might include critical actions (i.e., applications of the capabilities) and key intermediate results (e.g., supervisory, environmental, and client outcomes). An impact model is helpful for knowing what to include in your questionnaire to be used in the next step.

Third, conduct a survey research study to identify the best (i.e., success) cases and the worst cases. Unlike most survey research, responses are *not* anonymous because the purpose is to identify individuals. Data are collected from everyone if there are fewer than 100 people in the population; otherwise, a random sample is drawn.⁵ The survey instrument (i.e., the questionnaire) is usually quite short, unless you and the client decide to collect additional evaluation information.⁶ Three key questions for the questionnaire are the following: (a) “To what extent have you been able to use the [insert name of program here] to achieve success on [insert overall business goal here]?” (b) “Who is having a lot of success in using the [insert program name]?” and (c) “Who is having the least success in using the [insert program name]?” The survey data can be supplemented with performance records and any other information that might help you to locate success cases (e.g., word of mouth, customer satisfaction reports).

Fourth, conduct in-depth interviews with multiple *success cases*. Sometimes you will also want to interview a few non-success cases. The purpose of the fourth step is to gain detailed information necessary for empirically documenting the success case attributes and stories. During the interviews you should discuss categories of successful use and identify facilitating and inhibiting use factors. During the success case interviews, Brinkerhoff (2003) recommends that you address the following information categories:

1. What was used that worked?
2. What successful results/outcomes were achieved, and how did they make a difference?
3. What good did it do (i.e., what value did it have)?
4. What factors helped produce the successful results?
5. What additional suggestions does the interviewee have for improvement?

5 For information on determining sample size, see Johnson and Christensen (2020) or Christensen et al. (2020). A free program for determining sample size is provided here: www.gpower.hhu.de/en.html.

6 Note that the *survey instrument* is not properly called “the survey.” The “survey” is the research *method* that is implemented. Survey instruments include questionnaires (paper-and-pencil, web-based) and interview protocols (used in-person, over the phone, or via technologies such as Zoom or teleconferencing).

During non-success case interviews, the focus is on barriers and reasons for lack of use of what was expected to be provided by the program. You should also obtain suggestions for increasing future use. During and after all interviews, it is important to obtain *evidence* and carefully document the validity of the findings.

Fifth, communicate the evaluation findings. The report will include detailed data and evidence as well as rich narrative communicating how the program was successful and how it can be made even more successful in the future. Again, provide sufficient evidence so that the story is credible. Brinkerhoff (2003) recommends that you address the following six conclusions in the final report:

1. What worthwhile actions and results, if any, is the program helping to produce?
2. Are some parts of the program working better than others?
3. What environment factors are helping support success, and what factors are getting in the way?
4. How widespread is the scope of success?
5. What is the ROI (return on investment) of the new program?
6. How much more additional value could be derived from the program?

Brinkerhoff emphasizes that success case evaluation results must be used if long-term and company-wide success is to result. The most important strategy for ensuring employee “buy-in” and use of evaluation results and recommendations is to incorporate employee participation into all stages of the evaluation.

Patton’s Utilization-Focused Evaluation

Evaluation process and findings are of no value unless they are *used*. In the 1970s, Michael Patton introduced the Utilization-Focused Evaluation (U-FE) model, and today it is in its fourth edition (which is much updated/expanded from earlier editions) (Patton, 2008). U-FE is “evaluation done for and with specific intended users for specific, intended uses” (Patton, 2008, p. 37). The cardinal rule in U-FE is that the utility of an evaluation is to be judged by the degree to which it is used. The evaluator focuses on use from the beginning until the end of the evaluation, and during that time he or she continually facilitates use and organizational learning or any other process that helps ensure that the evaluation results will continue to be used once the evaluator leaves the organization. *Process use* occurs when clients learn the “logic” of evaluation and appreciate its use in the organization. Process use empowers organizational members to become internal evaluators.

Because U-FE is a participatory evaluation approach, the client and primary users will be actively involved in structuring, conducting, interpreting, and using the evaluation and its results. Here are the major steps:

1. *Conduct a readiness assessment* (i.e., determine if the organization and its leaders are ready and able to commit to U-FE).
2. *Identify the “primary intended users” and develop a working relationship with them* (i.e., primary intended users are the key individuals in the organization that have a stake in the evaluation and have the ability, credibility, power, and teachability to work with a U-FE evaluator in conducting an evaluation and using the results).

3. *Conduct a situational analysis* (i.e., examine the political context, stakeholder interests, and potential barriers and supports to use).
4. *Identify the “primary intended uses”* (e.g., program improvement, making major decisions, generating knowledge, and process use or empowering stakeholders to know how to conduct evaluations once the evaluator has left).
5. *Focus the evaluation* (i.e., identify stakeholders’ high-priority issues and questions).
6. *Design the evaluation* (that is feasible and will produce results that are credible, believable, valid, and actionable).
7. *Collect, analyze, and interpret the evaluation data* (and remember to use multiple methods and sources of evidence).
8. *Continually facilitate evaluation use.* For example, interim findings might be disseminated to the organization, rather than waiting for the “final written report.” U-FE does not stop with the final report; the evaluator must work with the organization until the findings are used.
9. *Conduct a metaevaluation* (i.e., an evaluation of the evaluation) to determine (a) the degree to which intended use was achieved, (b) whether additional uses occurred, and (c) whether any misuses and/or unintended consequences occurred. The evaluation is successful only if the findings are used effectively.

U-FE is a full approach to evaluation (Patton, 2008), but it also is an excellent approach to complement any of the other evaluation models presented in this chapter. Again, an evaluation that is not used is of little use to an organization; therefore, it is wise to consider the principles provided in U-FE.

To become an effective *utilization-focused evaluator*, we recommend that you take courses in human performance improvement, leadership and management, industrial-organizational psychology, organizational development, organizational communication, and organizational behavior. For a model showing many of the factors that affect evaluation use, read Johnson (1998). If you become a utilization-focused evaluator, it will be your job to continually facilitate use, starting from the moment you enter the organization. You will attempt to facilitate use by helping transform the state of the organization so that it is in better shape when you leave than when you entered.

Culturally Responsive Evaluation (CRE): Expanding an Understanding of Values in Evaluation

Alkin (2004; Alkin & Christie, 2023) breaks evaluation theories into three major branches. One is a methods branch exemplified by Rossi’s model. Another is a use branch, which focuses on making use of evaluation data and is exemplified by the CIPP model. The third branch is the values branch, which has its roots in Michael Scriven’s ideas discussed earlier, as well as Stake’s (1976) work on responsive evaluation. In recent years, the values branch has been increasingly developed and expanded to incorporate the voices of historically disadvantaged and disenfranchised groups. House’s work on democratic evaluation (House, 2023) is one theory that attempts to do so. He focuses on recognizing that it is important to prioritize the needs of those most vulnerable or disadvantaged.

In recent years, Culturally Responsive Evaluation (CRE) has focused evaluators on how traditionally culturally dominate ways of knowing and

valuing knowledge (arising out of Eurocentric, paternalistic, and capitalistic points of view) have led to the voices of people of color, indigenous people, and women being devalued and missed (Hood et al., 2015; Hopson & Shanker, 2023). Failures to attend to these voices in the context of evaluation creates difficulties in judging merit and worth. Questions arise as to whom is an instructional or human performance intervention worthwhile? Addressing these questions requires substantial consideration of these alternative ways of knowing at all phases of the evaluation process. This means paying attention to culture in the context of any evaluation. Culture refers to the values, rules, ways of knowing, and ways of acting that are characteristic of a group. As Hopson and Shanker note, paying attention to culture means more than a superficial inclusion of stakeholders (e.g., a focus group interview), but serious analysis of values that are guiding the evaluation. Being culturally responsive means making sure the intervention is designed such that the instruction and the assessments of outcomes honor the lived experience of those cultural groups. It also involves paying attention to the consequences of outcomes such that the results do not reinforce dominant cultural norms that create barriers to less privileged groups advancing. Looking at issues of privilege, disadvantage, and discrimination means that evaluators need to explore power relations between stakeholders. Additionally, being a member of that community and/or being able to engage with the community are necessary to help build trust and understanding. Evaluations done from a culturally responsive perspective typically will involve multiple team members (many of whom come from the group of interest) so that multiple perspectives are gained by strengthening the voices and empowering the disenfranchised.

CONCLUSION

Evaluation is important because (a) it is a part of all major models of instructional design, (b) it is a required skill for human performance technologists, (c) it provides a systematic procedure for making value judgments about programs and products, and (d) it can help improve employee and organizational performance. Some instructional designers may specialize in evaluation and become fulltime program evaluators. To learn more about evaluation as a profession, go to the website of the American Evaluation Association (www.eval.org/).

Stufflebeam's CIPP model focuses on program context, input(s), process, and product(s). Rossi's evaluation model focuses on tailoring each evaluation to local needs and focusing on one or more of the following domains: needs, theory, process/implementation, impact, and efficiency. Chen's TDE model focuses on articulating a program theory so that one will know how and why a program operates well or poorly. Kirkpatrick's model focuses on four levels of outcomes, including reactions, learning, transfer of learning, and business results. Brinkerhoff's SCM focuses on locating and understanding program successes so that success can become more widespread in the organization. Patton's U-FE model focuses on conducting evaluations that will be *used*. Lastly, over the last several years, CRE has become an important emphasis for evaluators. Being culturally responsive provides evaluators with crucial information for judging the merit and worth of the program being evaluated.

Summary of Key Principles

1. Evaluation is the process of determining the merit, worth, and value of things, and evaluations are the products of that process.
2. *Formative* evaluation focuses on improving the evaluation object, and *summative* evaluation focuses on determining the overall effectiveness, usefulness, or worth of the evaluation object.
3. Rossi shows that evaluation, broadly conceived, can include needs assessment, theory assessment, implementation assessment, impact assessment, and efficiency assessment.
4. Chen shows how an evaluator working with program staff articulates the program theory (includes an action model and change model) to facilitate development and evaluation of a program.
5. Kirkpatrick shows that training evaluations should examine participants' reactions, their learning (of knowledge, skills, and attitudes), their use of learning when they return to the workplace, and business results.
6. Brinkerhoff shows that organizational profits can be increased by learning from success cases and applying knowledge gained from studying these cases.
7. It is important that evaluation findings are *used* rather than "filed away," and Patton has developed an evaluation model specifically focused on producing evaluation use.
8. One effective way to increase the use of evaluation findings is through employee/stakeholder participation in the evaluation process.
9. An understanding of power relations and cultural differences provide evaluators with information to judge the merit and worth of a program, as well as to judge whether the program helps promote social justice.

Application Questions

1. Recent research indicates that most companies conduct level 1 evaluation and many conduct level 2 evaluation. However, organizations infrequently conduct evaluations at levels 3 and 4. Describe problems with this practice. Also provide reasons for this practice and explain how you would attempt to increase the use of level 3 and 4 evaluation.
2. Identify a recent instructional design or performance technology project on which you have worked. If you have not worked on any such project, interview someone who has. Describe how you did (or would) evaluate the project using one or more of the evaluation models explained in this chapter.
3. Using ideas presented in this chapter, construct *your own* "hybrid" evaluation model.
4. Culturally responsive evaluation focuses on cultural differences, stakeholders, and power relations within the context of program evaluation. For each of the following scenarios, describe the aspects of culture, the different stakeholders (parties with an interest in the program), and power relations that might affect the merit and worth of a particular intervention:

- a. Evaluation of a program to provide information about a vaccine in a minority community.
- b. Evaluation of a program to teach recycling practices in a city in northern India.
- c. Evaluation of a training program designed to train new managers in a technology company (organizations have cultures too).
- d. Evaluation of a professional development program for teachers in an elementary school that serves children in an urban area that is majority Hispanic.

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Measuring the Return on Investment (ROI) in Technology-Based Learning

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Integrating technology has transformed our lives and changed how we communicate, work, and learn. Although learning technologies have been appearing in workplaces over past decades, their impact has been much more profound than just incremental change – it has resulted in a complete shift in how we think about workplace learning. Technology-based learning allows us to engage with content in new ways, potentially changing how we think about learning. For example, we can now learn through interactive games and other immersive experiences.

Technology is no longer a tool but a transformative catalyst that embodies a socio-technical system (STS) and a symbiotic relationship between humans and machines. The need to foster this symbiosis between learner and technology prompts us to delve deeper into the dynamics of this collaboration. However, critical questions remain: How do we assess the impact of this partnership? How do we quantify the value it brings to learners, organizations, and the community? To answer these questions, this chapter will first explore the complexity between the learner and technology, examining how this symbiotic relationship can enhance learning experiences. We will consider how the Balanced Scorecard can be tailored to assess the effectiveness of technology-based learning initiatives to determine the efficacy against key performance indicators (KPIs). Next, we will discuss Kirkpatrick's levels of evaluation, Holton's evaluation model, Phillips's Return on Investment (ROI), and Rothwell's Evaluation Grid as effective tools to understand how individuals can transfer what they learned from training to their jobs. This final section emphasizes how learning and development initiatives can promote organizational innovation, highlighting the transformative potential of human creativity and how it contributes to the organization.

SYMBIOTIC RELATIONSHIP WITH TECHNOLOGY

A symbiotic relationship between technology and learning represents a fundamental change in how people interact with information, acquire new skills, and use educational resources (Azeem et al., 2022; Beldarrain, 2006). It signifies a dynamic interplay between the human intellect and the ever-evolving world of technology. Through the lens of this reciprocity, there is a fusion of traditional and digital learning methods, a demand for the democratization of knowledge through online platforms, the need to personalize learning experiences, and an evolution of emerging technologies such as artificial intelligence and virtual reality (Amarin, 2020; Blayone et al., 2017; Bozkurt & Stracke, 2023; Tan, 2023; Xie et al., 2019).

Traditional learning methods, such as lectures and textbooks, have merged with digital tools and resources to create a more contemporary learning experience. This amalgamation of resources enables a blended learning approach that combines the best of online and personal learning through the integration of print, video, web-based, and many other media platforms. In addition to attending virtual classes, learners can acquire digital textbooks, engage in interactive simulations, and use multimedia resources to supplement and enhance their learning experiences. Technology such as laptops or tablets can help facilitate “flipped classrooms,” where students interact with digital content before meeting in person for discussions and promote active learning (Ahmad et al., 2023). Online platforms have given more people access to knowledge. Learners from varied backgrounds and locations can access high-quality educational content, often for free or at a lower cost. Barriers to access have been significantly reduced by online learning, making it more inclusive and accessible to people around the world (Bozkurt & Stracke, 2023).

Technology, such as adaptive learning software, allows the creation of personalized learning paths tailored to individual needs, abilities, and interests. Data analytical tools and algorithms have become sophisticated enough in recent years to track learner progress and adjust content. The collection and analysis of vast amounts of learning behavior and performance data enable educational institutions and organizations to gain insights into the effectiveness of teaching methods and curriculum design (Xie et al., 2019). The Balanced Scorecard framework, which considers multiple performance dimensions, can help determine how personalized learning initiatives fit with strategic goals. This will be the focus of the next section.

MEASURING STRATEGIC GOALS: BALANCED SCORECARD

The Balanced Scorecard is a strategic framework developed by Robert Kaplan and David Norton in the early 1990s to measure performance from four perspectives: financial, customer, internal process, and learning and growth. Balanced Scorecards can be tailored to assess the effectiveness of technology-based learning initiatives (Kaplan, 2009; Kaplan & Norton, 1996).

Financial: Organizations can understand the effectiveness of their technology-based learning initiatives by looking at metrics that measure financial outcomes and determining how these learning initiatives affect their financial performance. This includes financial investments in learning interventions, such as content development, software and

hardware, licensing fees, employee training, and ongoing support and maintenance costs. Then determine how the technology-based initiative contributed to revenue or cost reduction (Govindan et al., 2023; Kaplan, 2009).

Customer: In technology-based learning, the customer could be both internal (employees) and external (suppliers, distributors, government regulators, or customers) or anyone using the technology for learning purposes (Rothwell, 2004). Metrics can include employee satisfaction with training programs, customer satisfaction with the quality of products, services provided by well-trained employees, and customer retention rates influenced by the expertise of the trained employee. One way to measure a program's success is to ask learners how satisfied they are with technology-based learning resources, whether they feel they have acquired new digital skills, and how effective they believe the training program was. This can include conducting surveys and assessments to gauge learner engagement and skill development (Kaplan, 2009; Tohidi et al., 2010).

Internal process: Measuring the efficiency and effectiveness of an organization's internal processes is essential to gauge how well they perform. Improvements in internal processes often prompt better financial results, increased productivity, and improved customer satisfaction. Examples of metrics that could measure technology-based learning could include the time to develop and implement them, the accuracy and relevance of training content, and the alignment of training programs with organizational goals and needs (Kaplan & Norton, 1996).

Learning and growth: The ability of individuals, teams, departments, or organizations to adapt, innovate, and learn is directly linked to employee training, skills development, knowledge management, and organizational culture metrics. Many ways exist to measure the impact of technology-based learning on employee development and organizational growth, such as employee skill acquisition rates, the percentage of employees participating in continuous learning programs, and the ability to attract and retain talent because of a reputation for investing in employee development (Narayanamma & Lalitha, 2016).

Key Performance Indicators (KPIs)

A key performance indicator (KPI) is a measurable value demonstrating how effectively an organization achieves critical business objectives. Organizations use KPIs at multiple levels to evaluate their success in reaching targets (Wang et al., 2010). It assesses progress toward achieving strategic objectives and is a tool for monitoring, analyzing, and improving an organization's performance. It helps identify areas where an organization excels and areas that need improvement. In technology-based learning, KPIs should reflect the organization's goals related to employee development, skill enhancement, and performance improvement. By selecting KPIs from each quadrant of the Balanced Scorecard, organizations ensure a comprehensive approach to evaluating the impact of technology-based learning on their performance (Li et al., 2016; Wang et al., 2010). This allows for a more comprehensive understanding of how technology-based learning impacts the organization, not just isolated

departments or processes. Examples of KPIs for technology-based learning can include:

- *Completion rates*: How long it takes to complete a technology-based learning intervention can measure engagement and commitment to learning.
- *Skills improvement*: Assess how much employees' skills and knowledge have improved after participating in technology-based learning programs and whether these improvements are significant enough to influence job performance.
- *Training time efficiency*: Measure the time to provide training compared to traditional methods such as face-to-face or in the classroom. A shorter training time can be an indicator of increased efficiency.
- *Content relevance*: Measures how well the learning content meets the learner's needs and is relevant, connected, and suitable for the target group.
- *Learning retention*: Determine how well employees remember and can use the knowledge gained through technology-based learning after a certain period.
- *Employee satisfaction*: A survey should be sent to employees to better understand how employees feel about technology-based learning programs.

DIFFERENT VIEWS OF EVALUATION

Kirkpatrick's model, a widely accepted framework for training evaluation, is based on assessing employees' reactions to training experiences, transferring acquired knowledge, subsequent behavioral changes, and the ultimate impact on organizational outcomes (Galloway, 2007; Kirkpatrick, 1959; Smidt et al., 2009). Faced with technology-driven transformations in a fast-paced setting, the methods to evaluate training outcomes persist. Despite the benefits of technology-based learning, it can pose unique challenges. Unlike classrooms, where learners have a uniform experience, technology-based learning can be highly individualized. Each learner engages with different resources and interacts uniquely with content, making standardized evaluations more complex. Although the potential benefits of technology-based learning remain enormous, the key is to continuously refine evaluation methods, use analytics intelligently, and ensure that assessments are designed to accurately reflect both the medium and learning outcomes. Therefore, evaluation methods and cost-benefit analysis must be critically reviewed to ensure their present relevance (Galloway, 2007).

The shift from classrooms to digital environments requires a dynamic approach to learning assessment. Knowledge acquisition is no longer limited to rigid structures; rather, it is a continuous, self-paced journey. The learning phase, as outlined in Kirkpatrick's model, can now be integrated into adaptive learning algorithms, enabling tailored content delivery and evaluation consistent with the learner's progress. Learning-based results go beyond individual performance to achieve organizational success. Here, the Phillips model, an extension of Kirkpatrick's framework, gains prominence (2003). The Phillips model extends the evaluation ladder by adding additional levels: ROI and intangible benefits (Phillips, 2005; Phillips & Phillips, 2008; Phillips, 2012).

This expansion provides a clear path for the intricate web of digital learning's impact on an organization.

Measuring Learning Favored by Business

Technology-driven training is increasingly popular. The amalgamation of Kirkpatrick's foundational principles and Phillips's ROI offers a more holistic and rigorous approach to assessing training outcomes, from the immediate reactions of participants to the financial impact on the organization (Phillips & Phillips, 2008). Real-time feedback mechanisms, data analytics, and AI-driven insights enable organizations to measure learning outcomes and their impact on a scale that was not previously possible. This allows for more accurate and efficient decision-making regarding organizational learning. The result is a harmonious blend of tradition and innovation, where these models not only adapt but thrive in the face of evolving learning paradigms. While Kirkpatrick's model remains popular, it is imperative to acknowledge its assumptions and potential for overgeneralizations, especially within the realm of eLearning (Allen, 2003). A hybrid approach that combines the Kirkpatrick and ROI models would be the ideal solution. This synthesis encapsulates the holistic evaluation of technology-based learning, encompassing qualitative data, such as the application of knowledge and the quantifiable return on investment.

Challenges to Calculating ROI

Calculating the ROI of training, especially technology-based learning, can be challenging. Various factors can make it difficult for organizations to obtain a precise and comprehensive measure of return.

Several external factors can be attributed to the improved outcome. For example, if there's an increase in revenues after sales training, how much of that increase can be directly attributed to the training? There are other considerations, such as marketing campaigns or seasonal trends, that can affect revenue. Not all learning outcomes have monetary value. While some benefits, like increased sales or reduced errors, are quantifiable, other improvements such as team morale, enhanced collaboration, or increased innovation, are harder to assign a direct monetary value to.

Phillips's model calculates ROI right after the program. However, the full impact of training, especially technology-based learning, might not be immediately noticeable or apparent. While it is easier to measure short-term metrics (like course completion rates), it is more difficult to track long-term outcomes, such as the continued application of learned skills or sustained behavioral changes (Phillips, 2012; Phillips & Phillips, 2008; Phillips, 2003, 1998).

Another challenge in calculating the ROI of training is that some learners may not interact with technology-based training the same way as others. With technology-based training platforms, learners can usually select the modules they want to complete. Some may feel confident about specific topics and skip them. This could mean they complete the training faster, but it could also mean they have missed critical information that could affect their performance. But others may find it necessary to revisit content several times to understand it. The learner who revisits the training module multiple times might also use more bandwidth, server resources, and additional assistance from instructors

or tech support. This could inadvertently increase the costs associated with delivering the training to that individual. This variability is also important to consider because it is the time employees spend on training instead of their regular tasks. If one employee finishes training in 5 hours, and another takes 10 hours for the same training, the cost in terms of time is different. Variabilities of these sorts complicate the ROI calculations.

While ROI provides a financial metric to evaluate training programs, it is the combined insight from all levels of evaluation – including ROI – that offers a richer, more pertinent understanding of training's impact. The first four levels of the training provide a direct review of the training's effectiveness. It provides not just the financial impact but also how participants felt about the training, what they learned, and how they applied it in their roles. The initial levels of the training program (especially reaction and learning) provide immediate feedback, which can lead to quick program adjustments. Understanding changes in behavior (level 3) is crucial. Even if the initial ROI is positive, if employees are not changing their behaviors in desired ways, the long-term impact of the training might be questionable.

Since 1950, when Kirkpatrick's evaluation model was created, it has been modified, extended, tinkered with, or revised. The CIRO (context, input, reaction, and outcome) approach developed by Warr et al. (1970) expanded the evaluation framework, focusing on organizational needs, resource inputs, reactions to training, and outcomes. Hamblin (1974) proposed evaluating training outcomes at five levels – reaction, learning, job behavior, organization performance, and ultimate value. Bushnell (1990) and Kaufman and Keller (1994) also introduced their modifications and perspectives on training evaluation. They argued that while models like Kirkpatrick's are foundational, the dynamic nature of businesses and learning environments necessitates a continuous evolution in how we assess training effectiveness.

Measuring Learning Favored by Academia (Holton)

While the Kirkpatrick model stands as a renowned and commonly used framework for understanding training effectiveness, it is crucial to recognize its limitations, especially when it comes to moderating variables. Consider this scenario: A company invests \$50,000 in a training program, and on paper, the results are impressive. The learning outcomes of the participants seem highly positive. On closer inspection, however, managers could detect subtle changes in behavior during daily tasks. These observed behavioral changes could be a residual outcome of the training that Kirkpatrick's and Phillips's models might overlook.

Let us dive deeper into the potential complexities. External factors that can affect an individual can encompass a range of elements – from personal life circumstances to broader organizational changes or even market dynamics. For example, an employee may be motivated to apply new skills learned during training not only because of the effectiveness of the training, but perhaps because of a recent promotion or the introduction of a new incentive structure. In such cases, attributing behavioral change exclusively to the ROI measure of training could lead to misleading conclusions.

This is where Holton's 2005 model offers additional insight. Holton emphasizes individual enabling elements, suggesting that the learner's

inherent attributes can influence the efficacy of a training program. Elements such as conscientiousness, neuroticism, goal orientation, and openness to experience are pivotal in determining how a participant will respond to training. It suggests that two individuals undergoing the same training may exhibit different outcomes based on their personal traits, and thus the ROI may differ.

Holton's model introduces the concept that organizational performance itself can act as a predictor for robust learning outcomes. A thriving, supportive environment could increase the positive effects of a training program, while a demotivating workplace could diminish them. In technology-based learning systems, the environment may be more challenging for learners to concentrate. The lack of human connection between the facilitator and the learner can be an additional challenge or obstacle, making it difficult for optimal learning to take place.

While models such as Kirkpatrick's provide a valuable starting point for understanding how effective training is, a more comprehensive approach that considers both individual traits and organizational dynamics can provide a better understanding of training effectiveness.

Measuring ROI

ROI is used as a metric to measure the success or failure of an investment, and in this case, the training program. A positive ROI would suggest the training program succeeded in achieving its goals. ROI is a quantifiable financial metric used to compare and evaluate the effectiveness of an investment by converting the benefit and cost into a single monetary value (Phillips, 2012, 2003, 1998; Phillips & Phillips, 2008). The formula to calculate ROI is:

$$\text{ROI (\%)} = (\text{Total revenue} - \text{Total cost}) / \text{Total cost} \times 100$$

Calculating the ROI of the training program involves identifying the cost of (assessing, designing, developing, and implementing) the training and isolating the benefits that resulted from the training. When the benefits outweigh the costs, businesses deem the program successful. The cost calculation includes the development cost of the course, the cost of outsourcing, the setup cost of the learning platform, the cost of materials, and any other related additional costs, such as opportunity cost. Conversely, the benefits can be complicated to quantify in monetary terms and are usually derived from customer satisfaction, productivity, revenue, or reduced production costs. Using a percentage in the ROI formula offers a standardized metric that makes it easier to compare the relative profitability of different investments; to get the percentage ratio, we divide by total cost and multiply by 100. Absolute dollar values can be misleading, as a significant profit from a huge investment could be less impressive than a relatively smaller profit from a much smaller investment. It is often difficult to calculate the direct monetary impact of training, but it is crucial to justify the costs so organizations can make informed decisions (Phillips & Phillips, 2008).

BEYOND ROI FOR LEARNING

While most writings on ROI – also known as cost-benefit analysis – focus on the immediate applications of training on the job, there is a missing link.

That missing link centers on calculating the value of near and far transfer of learning.

What Is Meant by Near and Far Transfer of Learning?

Traditionally, *near transfer of learning* refers to situations in which learners apply skills in settings that are identical to the training setting. *Far transfer of learning* refers to situations in which learners can apply skills in a new context. As a simplistic example, individuals trained to play the game Monopoly would demonstrate far transfer if they applied what they learned about the game to real-life decisions about investments and real estate.

When calculating ROI for transfer of learning, it is important to unbundle the costs and the benefits of training and its applications. That can be done at the individual level and at the group level. There is a cost associated with training for each participant. The costs are easier to calculate than the benefits. Among the easily identifiable costs of training are (and this is not an exhaustive list):

- Cost of labor to select/author learning experiences
- Cost of any training materials purchased externally
- Wage costs for workers participating in training during working hours
- Opportunity cost of training (productivity given up while workers participate in learning events)
- Cost of room rental or technology on which to deliver training
- Overhead costs (electricity, water, etc.)
- Travel costs to training
- Lodging costs for training
- Food and refreshment costs for training

Additional costs for technology-based training:

- Cost of the learning platform (licensing or subscription fees)
- Cost for software and tools for eLearning course development
- Cost for technology infrastructure (servers, cloud storage, hosting fees, data security, and backups)
- Cost for maintenance and support (software updates, technical support, data recovery services)
- Cost for integrating the training platform with other enterprise systems

The benefits of training are more difficult to calculate. They may include:

- Value of productivity increases resulting from training
- Value of time reductions in unproductive breaking-in periods for new employees or newly promoted employees
- Value of improved customer service resulting from training
- Value of reduced errors or product rejects
- Value of increased speed of service

Collective Learner's Transfer of Learning (Near and Far)

While it is possible to calculate the ROI of training transfer for individuals, it is also possible to add them up and use that figure to help to calculate the

collective ROI of an entire group of people who participated in a training event.

$$\text{Collective ROI (\%)} = \frac{(\text{Total group gains} - \text{Total training cost})}{\text{Total training cost}} \times 100$$

Aggregating the ROI gives stakeholders a macro-level view of how effective the training was for a larger group. This can be especially useful for organizational leaders or department heads when evaluating the value of training programs. By understanding the collective ROI, organizations can make more informed decisions about where to allocate their resources for training. If a particular training event has a high ROI for a department or team, it could be replicated or extended to other parts of the organization to achieve similar results. A positive collective ROI can justify allocating more resources to training, while a negative ROI might lead to reevaluating training content, providers, or methods. Observing how training transfers at a group level can give insights into team dynamics, managerial effectiveness, and organizational culture. For instance, if individuals show high training transfer but the group ROI is low, there may be systemic or cultural barriers impeding collective performance.

Business Impact From Human Innovation

Business impact differs from ROI. The value of training can be considered for its economic value. But recently it has become clear that ROI needs to extend to regard business goals in broader ways than mere profit and loss. The Balanced Scorecard defines business success across four quadrants: (1) financial value, (2) customer service, (3) internal business operations, and (4) organizational learning and growth. Only financial value (1) centers on ROI. Evaluating training purely on short-term costs and benefits provides an incomplete picture, potentially leading organizational leaders to misguided conclusions about the true value of their training investments.

By assessing both immediate and long-term effects in six areas (reaction, learning, behavioral change, learning outcomes, financial impact, and business impact), organizations can genuinely understand the depth, breadth, and longevity of their training investments. This comprehensive view ensures that training and development decisions are grounded in a holistic understanding of their actual impact on the organization.

ROTHWELL EVALUATION GRID™ (THE GRID)

The Rothwell Evaluation Grid™ (Figure 16.1) emerged as a tool to address the challenges of assessing efficacy and the impact of training programs over time. The Grid builds on the Kirkpatrick Hierarchy and offers a nuanced and comprehensive lens.

Historically, the Kirkpatrick Hierarchy delineated four key levels to evaluate training effectiveness: reaction, learning, behavior change, and results. As illustrated by the dotted triangle in Figure 16.1, this model offers a narrow snapshot of the training's impact. A significant critique of Kirkpatrick's framework is its limitation in scope and depth, capturing data at just a single moment, specifically right after the training concludes.

FIGURE 16.1 The Rothwell Evaluation Grid™ (The Grid)

The Rothwell Evaluation Grid™

Before the Learning Event (Baseline)	During the Learning Event (Formative)	After the Learning Event (Summative)	Long After the Learning Event (Impact)
		Business Impact ←	— KPIs and the Balanced Scorecard
		Financial Impact ←	— ROI/Cost-Benefit based on Phillips
		Results	
		Behavior Change	
		Learning	
		Reaction	

As Reio et al. (2017) state, “it is not sufficiently useful for formative evaluation, or the entire training process” (p. 39). Similarly, relying solely on ROI provides an incomplete view. While an ROI of 200% may seem impressive, it barely scratches the surface of a training program’s comprehensive influence, especially when considering the intangible benefits that are harder to quantify.

The Grid builds on Kirkpatrick’s model and offers a comprehensive perspective on the effectiveness of training. It creates six vertical components (rows) by synthesizing the four original evaluation levels (reaction, learning, behavioral change, and results) and incorporates the financial impact derived from Phillips’s ROI and business impact, guided by the Balanced Scorecard. However, what distinguishes the Grid is its temporal structure, encompassing before, during, after, and long after, which delineates the four horizontal dimensions (columns). This matrix serves as a holistic tool, capturing both depth and breadth in training evaluation. The Grid Worksheet (Exhibit 16.1) is designed to address both immediate and delayed effects of training and spans from individual reactions to overarching business outcomes. Consider the following when completing the worksheet:

- **Before the Learning Event** (Establish the Baseline)
 - *Business impact*: Identify strategic and operational KPIs
 - *Financial impact*: Identify the financial metrics that will be most impacted by the training
 - *Results*: Define the tangible outcomes expected from the training
 - *Behavior change*: Gauge the baseline demonstrated behavior before the training
 - *Learning*: Measure pre-training KSA (knowledge, skill, attitude) levels before the training
 - *Reaction*: Speculate learners’ expectations and attitudes about the upcoming training

- **During the Learning Event** (Monitor the Learning Progress)
 - *Business impact:* Examine the training's alignment with KPIs or strategic goals
 - *Financial impact:* Determine the direct costs associated with the learning event
 - *Results:* Compare the performance objectives against the baseline during the learning event
 - *Behavior change:* Observe the learner's participation/engagement level during the learning event (formative assessment)
 - *Learning:* Assess the learner's acquisition of information during the training (formative assessment)
 - *Reaction:* Assess the learner's attitudes and reactions during the training (formative assessment)
- **After the Learning Event** (Evaluate the Outcome)
 - *Business impact:* Evaluate the changes in KPIs because of the learning event
 - *Financial impact:* Evaluate the financial impact because of the learning event (ROI)
 - *Results:* Evaluate the outcomes because of the learning event
 - *Behavior change:* Evaluate the behavioral changes due to the learning event (summative assessment)
 - *Learning:* Evaluate the learner's KSA (post-training test) due to the learning event (summative assessment)
 - *Reaction:* Evaluate the learner's attitudes and reactions to the training (summative assessment)
- **Long After the Learning Event** (Analyze Sustained Impact)
 - *Business impact:* Examine the sustained KPIs due to the learning event
 - *Financial impact:* Determine the continued ROI and the diminishing returns of the learning event
 - *Results:* Explore the enduring tangible benefits of the learning event
 - *Behavior change:* Study the longevity of behavioral changes post-training
 - *Learning:* Appraise the learner's long-term KSA post-training
 - *Reaction:* Appraise the learner's long-term attitudes and reactions to the learning event

By systematically tracking the six areas of impact across these four time-stamps, the Grid allows organizations to see both immediate benefits of initiatives and the positive effects over time. Utilizing this approach, organizations can develop a more comprehensive understanding of their training investments and ensure these investments are aligned with both immediate needs and long-term strategic goals.

Overall benefit (R) can be determined by considering different phases of its impact (during, after, and long after) and assigning weight to each phase to reflect their relative importance. Weighting factors can be assigned to each phase to signify their relative importance. These weighting factors provide a means to customize the formula based on specific goals and priorities, enabling the assessment of the learning event's value. Technology-based training, including the initial development cost of AI-powered solutions, can be

EXHIBIT 16.1 A multidimensional approach to assessing training effectiveness and impact

<i>Directions:</i> For each question appearing in the left column below, answer in the right column.		
Questions		Your Answers
1	Could you tell me a story about a time when you applied on the job what you learned in training? Describe it.	
2	Tell how you applied the new idea.	
3	Tell me what results were obtained from what you did? Were you able to reduce costs, increase revenue, serve new customers, find ways to serve old customers, or what?	
4	What was the value of what you did? While financial value is one way to find value, there are other ways—such as enhanced customer service, improved employee development, or other “value adds” to the organization.	
5	Who was involved in this situation?	
6	When and where did this situation occur?	
7	What was the training course?	
8	Where did this occur?	
9	Why do you believe this new idea was especially important to the organization?	

a substantial investment. This forward-looking approach can assist managers in making decisions based on more accurate assumptions on the expected ROI. For instance, if a software development team creates a training program focused on advanced coding techniques, the emphasis might be placed on the post-event return, warranting a higher weight. On the other hand, for a health-care organization investing in a comprehensive training program for nurses in patient care and safety culture of the organization, the training’s long-term impact might be given greater importance in the weighting factors.

CONCLUSION

This chapter underscores the profound influence of technology on modern learning and the complexities involved in evaluating its impact. As technology integrates further into learning ecosystems, evaluation methodologies will need to evolve to ensure a holistic understanding of training outcomes. We have reviewed traditional forms of evaluation and ROI calculations and pointed out ways in which these tools have been less than comprehensive and effective. We have proposed an expansion that includes deeper understandings of learning transfer, and impacts over time.

Summary of Key Principles

1. **Socio-technical system (STS) and human-technology symbiosis:** Technology is no longer a tool; it is intertwined with our lives in a socio-technical system. This has led to a symbiotic relationship between humans and technology, with technology influencing every facet of our daily activities.
2. **Evaluating technology-based learning:** There are various challenges in assessing the impact of technology-based learning due to its individualized nature. ROI provides a financial metric, but understanding training's impact requires a comprehensive evaluation across multiple levels.
3. **Return on investment (ROI) in training:** Calculating the ROI of training programs, especially those based on technology, is a multifaceted process. Factors like the variability in learners' interactions with the training, the need to account for external influences on outcomes, and challenges in attributing monetary value to non-tangible benefits make ROI a nuanced metric.
4. **Transfer of learning:** Distinction between near and far transfer of learning, where near transfer refers to the application of skills and knowledge in situations or contexts that are similar to the training context and far transfer involves applying skills and knowledge in a different context, where individuals take what they've learned and apply it in innovative ways, potentially creating new solutions, products, processes, or strategies that hadn't been considered.
5. **Evolving training evaluation models:** Several models, such as the Kirkpatrick Hierarchy and the Rothwell Evaluation Grid™, offer frameworks for evaluating training efficacy. These models underscore the need for continuous evolution in training assessment methods, emphasizing both immediate reactions and long-term behavioral changes to ascertain the overall impact.

Application Questions

Imagine you are tasked with evaluating the ROI of a new technology-based learning initiative at your company. Given the challenges presented by technology-driven transformations, such as individualized learning experiences and non-uniform interactions with content, design a plan to measure the long-term outcomes and sustained behavioral changes after implementing a technology-based training (recommend using Exhibit 16.1, The Grid Worksheet):

1. What baseline data would you collect before the initiative to ensure you can measure change over time?
2. What checkpoints or interim measurements would you put in place while the learning event is ongoing?
3. What post-assessment tools would you employ to gauge immediate effects?
4. How would you measure the long-term impacts, say, six months or a year after the training? What tools or methods would you employ?

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Learning Engineering

Ellen D. Wagner

Learning engineering is an emerging arena of professional practice that combines knowledge of theories and research methods from learning sciences and human cognition with performance problem-solving methodologies and techniques used in engineering. The motivation to establish a discipline that combines learning science constructs with engineering constructs comes from a desire to optimize the efficacy of learning supports by developing learning solutions that scale. “Scale” refers to increasing the number of learners that can be served when using platforms and applications to distribute learning content, courses and experiences. The promise of learning engineering is the offer of connecting the theories, the epistemologies and the methodologies of learning and cognition with the modeling, the measures, the instrumentation, the continuous formative evaluation and the standards coming from engineering practice to develop more responsive products and solutions that (also) make learning support more scalable.

WHY LEARNING ENGINEERING?

Contemporary higher education has been embracing digital technologies, platforms and apps to support student learning and development for more than three decades. These educational technologies include learning management systems and student success platforms; instructional delivery technologies, including Massive Open Online Courses (MOOCs), and virtual courses built using web conferencing tools such as Zoom and Microsoft Teams; and content creation tools such as Articulate, Captivate and PowerPoint. Apple and Google app stores offer vast numbers of applications for mobile learning and performance support. These days, digital learning tools also include serious games, simulations, immersions and augmented reality, all advanced multimedia formats that occupy a growing part of the current learning technologies ecosystem. Ledger technologies such as blockchain are transforming college transcripts into secure, personalized learning records that are starting to be cross-walked with open badges, micro-credentials and certifications of skills and competencies. The seemingly sudden emergence of generative AI

tools such as ChatGPT, MidJourney and DALL-E2 has forced us to see how profoundly our worlds of learning and work are going to be transformed; what are we going to do now that our tools are empowered with artificial intelligence and can write and appear to reason almost as well as people can?

Learning engineering promotes optimizing outcomes and experiences using techniques of solution modeling (e.g., creating real prototypes to test in practice), measurement (e.g., data for specifications, assessments, results), instrumentation (e.g., how are data collected, compiled, analyzed and inter-operated) and continuous formative improvement of learning solutions in practice, which in quasi-experimental settings could also include formal A/B testing. Technology standards are employed to ensure data and platform interoperability. In addition to hypothesis testing, there is emphasis on post-hoc analysis of user data captured through keystroke interactions and other direct user inputs to the platforms and systems used to distribute and manage learning courses, content and experiences. Given the potential size of data sets of interest, these post-hoc analyses increasingly utilize machine learning, predictions, deep learning and even some forms of artificial intelligence to look for meaningful patterns. The engineering elements included in learning engineering give learning professionals a problem-solving framework for developing learning solutions that scale. Engineering methods ensure that advanced technologies are as responsive to essential technological performance requirements as they are to considerations for supporting, engaging and inspiring learners (Baker & Boser, 2021).

WHERE ARE THE INSTRUCTIONAL DESIGNERS?

As noted in an earlier paragraph, contemporary higher education has already embraced a vast array of digital technologies, platforms and apps for learning, and has been doing this transformative work for more than three decades. The transformative successes that higher education experienced during this time has been driven in large measure by professional practitioners from a field known as instructional design. Instructional design is a specific term used to describe the discipline of designing instruction; it is also a broad, conceptual term used to describe several closely related problem-solving approaches (including instructional systems design, learning design, and learning experience design). In this broad, conceptual capacity, people refer to the practice as instructional design, also known as ID. Practitioners are known as IDs. ID is a process used to design and develop instruction, training, learning support, learning experiences and performance improvement solutions. ID professionals are specialists in assessing performance and learning problems and creating designs to actively address those problems. While the essential role that the learning sciences play are self-evident to most people in the learning engineering evolution, the role that instructional, learning and experiences designers play has been less visible in some of the current learning engineering descriptions.

WHAT CHANGED?

Several factors have contributed to the desire to add engineering-styled problem solving to the mix of disciplines involved with designing and developing learning solutions that scale:

The first factor is technological complexity. Instructional, learning and learning experience designers are all specialists in creating designs for technology-mediated learning, but they are not necessarily aware of what it takes to interoperate increasingly complex enterprise technology infrastructure.

The second factor is related to ongoing changes in terminology. The term “educational technology” is now used to describe the technology platforms and tools used in K–12 settings. As “ed tech” increasingly referred to K–12 technology tools, practitioners of what used to be known as educational technology took to referring to what they did by a variety of other names, including instructional designer, instructional systems designer, learning designer and learning experience designer, with each term expressing slightly nuanced application considerations. While ID scholars and practitioners were keenly aware of the various nuances affecting the discipline and practice, people coming from outside education did not see these nuanced interpretations of the field as exemplars from a bigger, overarching discipline. Instead, institutional leaders looking to find agents of transformational change called for the development of the role of a learning engineer to play the role of change agent. Learning scientists were seen as an attractive collaboration partner to make that happen.

The third factor featured data and what to do with the troves of data created through the use of institutional learning technology platforms and tools. Collecting, maintaining and analyzing the data coming from user interaction with platform technologies gave researchers and analysts the raw materials they could use to look for new patterns of engagement that had not previously been available when using social science research methods. Prior to 2009, educational institutions traditionally stayed away from using student data and predictive analytics to support instructional decision-making. After the Bill & Melinda Gates Foundation, the Lumina Foundation and the US Department of Education began their active support of using analytics to remove barriers toward student success using predictive analytics (e.g., Bill & Melinda Gates Foundation, 2009), the practice-driven barriers that scholars had been advised to follow that avoided using predictive analytics and data mining in educational research began to soften.

“Big data” research methodologies, from predictive analytics, machine learning and deep learning, began to unbundle previously unseen relationships between technology utilization and learner performance. Using novel (for education) statistical methods, it was possible to begin building data models to test assumptions about learning interventions, actively measuring the impact of interventions on learner performance, creating instrumentation to reliably evaluate outcomes and then assessing and validating results of interventions on learner outcomes. In these examples, the focus was not so much to “engineer learning” per se as it was to leverage engineering methods to further our understanding of learning enablement and to construct learning supports that helped learners perform better.

LEARNING ENGINEERING TRIGGERS AND DRIVERS

The following section provides a brief description of key triggers (top-down declarations of learning engineering value) and drivers (need-based recognition of learning engineering value) shaping current thinking about the value

that learning engineering offers. Triggers include Herbert Simon's advice to university presidents to have a learning engineer at their side and MIT's recommendation to establish learning engineers as the creative professionals that help build bridges between faculty and students and among disciplines. It also includes drivers such as 1) finding that online learning fueled the use of predictive analytics in higher education, 2) the establishment of the IEEE Industry Connections Industry Consortium on Learning Engineering (ICICLE) and 3) the launch of Schmidt Futures' Learning Engineering Virtual Institute.

Trigger: Herbert Simon and the Learning Engineer

The idea of learning engineering is attributed to Herbert Simon. In a 1966 speech to university presidents at Princeton University (and later in a 1967 article based upon that speech), Simon shared a radical vision that colleges and universities could improve their professionalism by increasing the use of scientific methods and business processes in university administration and operation. Simon believed that increasing the use of scientific methods and business processes would make it possible to improve the returns on investment in college infrastructure and operational management, which in turn would lead to increased efficiency and better outcomes in curricular development, teaching, and ultimately, in student learning (Simon, 1967).

In particular, Simon believed there was value in providing college presidents with a "learning engineer" – a professional contributor, expert in the design of optimized learning environments. The learning engineer would be an institutional specialist with several responsibilities related to optimizing university productivity. They would be responsible to work collaboratively with faculty to design learning experiences within disciplines. They would also be expected to work with administration to improve the design of the broader campus environment to facilitate student learning and faculty improvements.

The strength of Simon's contributions and that of his students, his collaborators and his colleagues established a unique learning engineering ethos at Carnegie Mellon University that has continued to the current day. His vision has been acknowledged with the establishment of the Simon Initiative, CMU's home of learning engineering.

Driver: Online Learning and "Big Data" in US Higher Education

The catalyst for "big data" methodologies in educational settings in the early and mid-2000s emerged from the expanding use of online learning. Online learning offered researchers and analysts surprisingly rich digital environments for expanding how to think about learning content, learning environments and learning experiences. In a digital learning environment, every single interaction with the digital platforms involved in serving learning content and experiences results in data points. Following the lead of businesses using predictive analytics to anticipate opportunities for improving business outcomes and efficiency (e.g., Siegel, 2016), forward-thinking online learning institutions began applying predictive analytics and deep learning techniques such as neural networks and Chi-square automatic interaction detection (CHAID) to their student records to look for patterns that might help answer questions such as: What causes students to drop out? Are these causes common across all

institutions and categories of students? Is there anything we can do to remove barriers to student success?

In 2011, members of the Western Interstate Commission for Higher Education's (WICHE's) Cooperative for Educational Technology (WCET) founded a data analytics research project called the Predictive Analytics Reporting (PAR) Framework. They were motivated to work on improving the retention and completion rates of their US post-secondary online learning programs, including part-time and adult students, populations that were not included in the IPEDS national student data records at that time (Wagner & Longanecker, 2016). WCET supported the work of the institutional partners with a team of data scientists that built predictive models, managed the data, worked with each institution's leaders and directed all project operations in partnership with institutional teams (Ice et al., 2012). They worked with learning, research and technology experts at each institution to reach consensus on a common set of variables to build predictive models and conduct analyses. These mixed teams of experts explored the advantages and disadvantages of various statistical and methodological approaches to assessing factors contributing to student retention, progression, and completion.

As learning analytics caught on in online learning reporting and research, the growing popularity of MOOCs contributed to the growing "big data" wave in US higher education with a different form of online learning. MOOCs were a variation on the prevailing model of distance learning, which worked toward replicating the classroom experience. In the case of MOOCs, open enrollment online classes in high-interest courses from Ivy League universities were able to attract hundreds of thousands of simultaneously enrolled students. Having so many students simultaneously enrolled in online courses meant needing to deal with student data in ways and at a scale that had been previously unimaginable (Dede et al., 2019). Furthermore, now that "big data" were increasingly familiar to educational researchers, educational research was no longer confined to social science methods that depended on small sample sizes or random-controlled trial studies. Instead, prediction was legitimized. Data mining was no longer shunned. Deep learning could be applied to research on course-related behaviors, achievements, retention, persistence and completion patterns.

The history of these very large, open MOOCs from the 2010s typically reports that they were a failure. The thousands of students that signed up for these free, open enrollment courses rarely finished their programs of study, and in higher education that is considered a failure, even if students saw these as very different learning experiences than the conventional college course. The companies formed from the successful launches of MOOCs at Stanford (Coursera and Udacity), Harvard and MIT (EdX) developed new business models that backed away from free open courses to providing operational support for managing and distributing high-value courses and programs in partnerships with universities, for a fee, all over the world. Even so, the unintended consequences of responding to the scope and scale of interest in online learning experiences was a catalyst for reconsidering what higher education could be, if only we could realize the promises of what online learning appeared to offer. In this regard, online learning was a catalyst for data-informed institutional transformation rather than a failure.

Trigger: Online Learning: A Catalyst for Higher Ed Reforms (Willcox et al., 2016)

In 2013, the president of MIT, L. Rafael Reif, launched the Task Force on the Future of Education at MIT, charging groups of faculty, students and staff to explore potential future models of teaching and learning, especially in light of the advances in online education that were starting to appear as described in the previous sections. Over the period of a year, the MIT community developed four recommendations that were further refined in a subsequent review and publication of the final version of the Report in 2016. A copy of the final report, **Online Learning: A Catalyst for Higher Ed Reform** can be found *here*.

The four recommendations from this report included:

1. *Increase Interdisciplinary Collaboration Across Fields of Research in Higher Education* (Willcox et al., 2016, p. 23)
2. *Promote Online as an Important Facilitator in Higher Education* (Willcox et al., 2016, p. 24)
3. *Support the Expanding Profession of the “Learning Engineer”* (Willcox et al., 2016, p. 25)
4. *Foster Institutional and Organizational Change in Higher Education to Implement These Reforms* (Willcox et al., 2016, p. 27)

The report was a bold document, asserting that online education offers a number of significant and unique affordances for completely rethinking education. The report described how digital technologies could play a significant role as an education enabler by providing a dynamic digital scaffolding that enables “instrumented” learning. Additional digital scaffolding components which are effective in online and blended environments are discussed in the report. “While online technologies are relatively young, we find they already show promise in providing learning support at a cognitive level” (Willcox et al., 2016, p. ix).

The report was unequivocal in recommending expanded use of learning engineers and greater support for this emerging profession:

Improvements to the learning experience in higher education will not occur spontaneously. In our conception, a “learning engineer” is a creative professional who helps build bridges between fields of education and develops additional infrastructure to help teachers teach and students learn. Learning engineers must integrate their knowledge of a discipline with broad understanding of advanced principles from across the fields of education. They must be familiar with state-of-the-art educational technologies, from commercial software to open-source tools, and skilled in the effective use of new online tools. Moreover, they must be able to work with educators, both to create new learning experiences from scratch and to integrate new technologies and approaches into existing experiences, whether online or in-person or both. We propose a new way to look at the design of learning experiences and their implementation which relies heavily on learning engineers to stimulate improvements at scale.

(Willcox et al., 2016, p. ix)

At the time this report was published, the MIT editors noted that the recommendations were specifically written with the MIT stakeholder community and its unique attributes and affordances in mind. Nevertheless, these recommendations were a particularly powerful testimonial to the transformational power of online learning and to the value that could be realized by introducing learning engineers to the contemporary academic mix.

Not surprisingly, the call for learning engineers did not resonate well with the various instructional design communities that were underway with their online learning initiatives on campuses around the country and beyond. Not surprisingly the report's publication resulted in pushback, when ID contributors realized that their institutional leaders were seemingly unaware of their ongoing contributions to the learning enterprise. As Audrey Watters observed in her blog *Hack Education*:

The report prompted a *flurry of articles* about the current breed, if you will, of professional – those whose job titles include “instructional designer” and “instructional technologist” and whose degrees are in “education technology,” “curriculum and instruction,” and the like. Was “learning engineer” simply a rebranding? A way to rename one’s profession into *power* and *prestige* by associating it with the broader field – the *lucrative* field – of engineering? Or by associating it with elite, engineering-oriented institutions like MIT, Stanford, and Carnegie Mellon? (emphasis in original)

However, the real cut came in Watters’s closing lines. It was clear that big data analyses in educational settings were raising concerns for using student data being used as “institutional currency”, with learning engineers essentially enabling student surveillance to benefit the institution, noting:

“Learning engineers,” largely untethered from history and purposefully severed from the kind of commitment to democratic practices urged by Dewey, are poised to be the agents of surveillance capital.

(Watters, 2019)

Just like that, learning engineers found themselves identified as agents, not of change but of surveillance, using student data – “spying on students” – for the financial gain of their institution.

Driver: Industry Connections Industry Consortium on Learning Engineering (ICICLE), 2017

Around this time, the Standards Association of the Institute of Electrical and Electronics Engineers (IEEE) recognized the potential benefit of supporting learning engineering as both a profession and an academic discipline. In December 2017, the Learning Technology Standards Committee of IEEE approved the creation of the IEEE Industry Connections Industry Consortium on Learning Engineering (ICICLE). ICICLE was formed the following year to define this growing field and to advocate for the development of both the professional and academic disciplines of learning engineering (Wagner & Lis, 2018). The original focus to formally support developing a new academic discipline ended up not being one of ICICLE’s priorities for its subsequent

authorizations because of the priorities of its sponsoring committee. ICICLE focused on being advocates for learning engineering in practice. Members of ICICLE collaborated on a definition positing that “Learning Engineering is a process and practice that applies the learning sciences using human-centered engineering design methodologies and data-informed decision making to support learners and their development” (ICICLE, 2020). ICICLE also staked out a framework to articulate competencies expected from successful learning engineers. In addition to understanding principles of engineering design and learning science, it was ICICLE’s opinion that the learning engineer would need to understand:

- Current and historical product trends and the strengths and weaknesses of a variety of learning technology implementations
- Data standards and regulations around learning data and privacy
- Best practices in technical project management and in the design of learning technologies and learning ecosystems
- The factors contributing to success and failure in the design, development, deployment and outcomes of learning technologies

Driver: Learning Engineering, Schmidt Futures and the Institute of Education Sciences (IES), 2019

In May 2019, Schmidt Futures (the private foundation of Eric and Wendy Schmidt) convened a summit of learning engineering advocates from multiple foundations, the US Department of Education’s Institute for Educational Sciences, higher educational institutions and professional associations, including IEEE-ICICLE. The call was to explore ways to better leverage computer science, using data science and learning sciences, to accelerate rates of improvement in K–12 math and reading using learning engineering techniques. It also looked to encourage collaborations with researchers and technologists to develop software to encourage greater experimentation in direct instructional settings. Under the direction of Kumar Garg and with support from the Learning Agency, they launched LEVI, the Learning Engineering Virtual Institute. This effort was intended to validate using learning engineering methodologies to accelerate the use of instructional experimentation and continuous learning improvements through real-time formative evaluation.

Tom Kalil, Schmidt Futures’ chief innovation officer, observed in a February 15, 2023, Tyton Partners blog that Schmidt Futures

is particularly interested in creating an infrastructure for continuous improvement. We see in K-12 education that productivity is negative. We doubled real pupil expenditures on K-12 education, and there have not been significant improvements in learning outcomes. Imagine creating a learning environment that gets better at not only identifying student misconceptions, but figures out what the right pedagogical strategy to address those misconceptions is? That way, online and blended learning environments would get better as more students use them and as researchers had the ability to do more A/B testing.

(Kalil, 2023)

Much of the work of LEVI and of the Learning Agency's affiliated programs supporting learning engineering since 2019 has focused on encouraging collaborations between learning researchers, learning engineers and technology enterprises that are either directly or indirectly affiliated with higher educational institutions. The point of these collaborations is to build new products that enable more active research in direct instruction. These Schmidt Futures efforts are supporting an entire category of technology products driven by new research possibilities that test learning theories in practice (Baker et al., 2022). Recent Requests for Proposals from the US Department of Education IES continue to encourage grant submissions for projects that explore the potential of advanced educational technologies to mitigate the learning losses from the pandemic. Among their showcased examples are programs such as ASSISTments, by the Worcester Polytechnic Institute, designed to continuously improve math instruction through the use of evaluative technology that can help scholars conduct research on classroom experimentation in schools.

DISCUSSION: ARE WE THERE YET?

These triggers and drivers come from distinct parts of the learning and technology ecosystem.

Learning engineers were first envisioned as agents of improving institutional professionalism by increasing scientific methods and business processes in university administration and operation by promoting early experimentation in instruction and experimenting with combinations of disciplines (Simon, 1967). Online learning took early advantage of the data being created as learners used learning platforms and transformed our way of thinking about how learning data from the same systems serving and managing online learning could be used to better design and develop creative teaching and learning for online learning courses, content and resources (Willcox et al., 2016; Wagner & Longanecker, 2016; Dede et al., 2019). ICICLE supports learning engineering by looking for ways to bring tools to learning environments using constructs from the learning sciences, combined with advanced technology systems, to facilitate replicability and scale. Schmidt Futures and IES have been driving a slightly different kind of learning engineering agenda by creating research platforms for instructional experimentation for use in K–12 instructional settings, supported by active investment in research efforts fostering continuous formative improvement and A/B testing. They are championing the development of learning engineering research frameworks and guidelines (see Baker et al., 2022 for their 9-point Learning Engineering Research Framework).

Despite the transformations enabled by each of these triggers and drivers, and the number of potential opportunities where learning engineering methods will be likely to accelerate the move toward AI (artificial intelligence), learning engineering still seems to raise more questions than answers. Descriptions of the role, function and value of learning engineering continue to be inconsistent. No single approach for doing the work of learning engineering has emerged. No single job description has provided academic programs or hiring managers with true exemplars of what to include in the curriculum OR the job description. What *is* emerging so far is a sense of ambiguity about what learning engineering is, what it focuses on and who it really serves.

Piotr Mitros, known for his work on the learning management platform developed by MIT to support their hundreds of thousands of MOOC students, and as a contributor to the Schmidt Futures–supported Learning Engineering Google Group, articulated growing concerns of learning engineering stakeholders when he asked in the group discussion thread:

Where are the engineers?

Between 2018 and 2021, how did learning engineering turn into ed-tech?

(Mitros, 2021)

This second question was a direct reference to Schmidt Futures' keen interest in promoting the development of new research technologies for conducting experiments in classrooms and the attention being paid to encouraging various "moonshot" development projects, with winners receiving significant cash awards. The first was a direct reference to the imbalance between the percentage of Google Group members coming from learning communities compared to members from engineering communities. In his reflections that followed those questions, he made the following observations:

Outside of software "engineering," most engineering projects are completed in relatively predictable timeframes with relatively predictable outcomes. If I'm building an office building, I can model everything from the acoustics to how resilient it will be in an earthquake *before* I've built it. That's my aspiration for learning engineering – robust, replicable, understandable abstractions and models we can engineering with. And while I agree with "iterative" right now, I'll mention a lot of engineering design processes are *not* iterative once those engineering disciplines become mature. We used to build big buildings, and if they fell down, we'd iterate. Now, few buildings fall down. On the other hand, we fail a lot of students.

(Mitros, 2021, emphasis in original)

THE VALUE OF ESTABLISHING A LEARNING ENGINEERING ONTOLOGY

Given the various points of view at play, there may be value in establishing an ontology for learning engineering to bring more order to this discussion. A learning engineering ontology would provide explicit formal specification to define the discipline of learning engineering. With an ontology, one can articulate epistemologies and identify essential methodologies. Without an epistemology, a discipline has no methodological foundation; it cannot build a reliable literature base. An ontology defines the common vocabulary researchers need so they can share information within and across a domain. It includes machine-interpretable definitions of basic concepts in the domain and the relationships among them. This will be increasingly significant in design and development work, as ontologies are widely used in web architectures.

A preliminary approach toward learning engineering ontology development that highlights essential constructs from learning sciences, instructional/learning/experience design and engineering may collectively help establish a preliminary investigative framework for this new, emergent discipline. To be

thorough, it may even be appropriate to examine and compare instructional/learning/experience with engineering design, to determine if we are talking about different, comparable or overlapping design traditions. This approach allows contributors from any part of the contributing arenas of professional endeavor to validate the use of shared epistemologies and methodologies as techniques across the three disciplines that are at play.

Benefits of creating a learning engineering ontology include:

- Sharing common understandings of the structure of information among people and software agents
- Analyzing domain knowledge
- Reusing domain knowledge
- Making domain assumptions explicit
- Separating domain knowledge from operational knowledge

(Noy & McGuinness, 2001)

By including essential constructs from the learning sciences, from instructional, learning, and learning experience design and from engineering it will be possible to establish a framework that addresses issues from the theoretical to the applied. It also provides a mechanism for evaluating technological variables in concert with the human factors that can wreak havoc if not carefully constructed in conjunction with infrastructure planning.

LEARNING SCIENCES DESCRIBE UNIQUE HUMAN CAPABILITIES, WHILE ENGINEERING STANDARDIZES AND SCALES

Sommerhoff et al. (2018) remind us that the learning sciences started to grow as an academic community of practice some 30 years ago, when the idea of investigating learning and teaching in the real world brought together scientists from various research areas. Stemming from fields like psychology, sociology, computer science, design studies, science, mathematics, medical education, social work and the young field of cognitive science, these scientists had diverse academic backgrounds regarding both theory and methods. Consequently, a characteristic of the learning sciences was and continues to be its multifaceted nature, originating from the involvement of diverse scientific fields, each contributing to research on learning and supporting learning in its own way.

When learning sciences scholars (e.g., Lee, 2022) suggest that learning engineering is an extension of learning sciences – or, per Kessler et al. (2021), even suggest that learning engineering can be viewed as “applied learning science” – they diminish the role that engineering is playing in this new amalgamation. With learning sciences (which, as Lee observes, is flexible enough that there are points of view about whether one talks about “learning science” or “the learning science(s)”), there is flexibility in how the community of learning scientists views the multivariate learning science constructs that define the field. This flexibility is notable in its inclusiveness, but it does increase the ambiguity of some of the positions being taken in the literature. This is especially relevant for situations where modeling repeatable processes and measuring impact to determine product efficacy is being evaluated.

LEARNING ENGINEERING OPPORTUNITIES FOR INSTRUCTIONAL/LEARNING/EXPERIENCE DESIGN PROFESSIONALS

Learning engineering represents a new channel of opportunity for instructional designers interested in the efficacy and impact that educational interventions may have on student achievement. At its core, learning engineering merges insights from learning sciences, data analytics and technology to create optimized learning experiences. As the modern learning landscape becomes more digital and data-driven, there's an undeniable value in intertwining the human-centered approach of instructional design with the empirically grounded methodologies of learning engineering.

One of the primary ways instructional designers can benefit from this convergence is by acquiring proficiency in data analytics. In the age of e-learning platforms and digital classrooms, every interaction a learner makes generates valuable data. By learning to analyze this data, instructional designers can gain a deep understanding of learners' behaviors, preferences and areas of struggle.

Furthermore, as technology continually reshapes the educational ecosystem, grounding oneself in the principles of learning engineering can equip instructional designers with the tools to innovate. Knowledge about emerging technologies such as artificial intelligence, augmented reality or adaptive learning systems can redefine the boundaries of instructional design. By leveraging these tools, designers can create not just content, but immersive, adaptive and personalized learning experiences that cater to the diverse needs of the 21st-century learner. In essence, by melding the principles of instructional design with the advancements in learning engineering, professionals in the field can remain at the forefront of creating impactful and resonant educational experiences.

Summary of Key Principles

1. Learning engineering is an emerging new discipline. It seeks to combine theories and strategies from the learning sciences with engineering methods such as modeling, measurement, instrumentation, continuous formative evaluation and the use of technology standards. This combination of expertise is envisioned as a way to facilitate producing empirically validated learning content, courses, assets and experiences that can scale.
2. Learning engineering advocates have emerged from the hard sciences, including astronomy, biology, medicine, computer sciences and data science. They also come from engineering disciplines, including electrical engineering and mechanical engineering. These academic contributors leverage scientific methodologies in their work, including analytical techniques such as machine learning and deep learning methodologies that, until fairly recently, were unfamiliar territory for educational researchers.
3. While the essential role that the learning sciences play in understanding human learning capabilities are self-evident in this amalgamation, the role that instructional, learning and experience designers play has been less apparent in some of the current descriptions.

4. Establishing an ontology of learning engineering may eliminate the ambiguity that is affecting learning engineering's adoption. A learning engineering ontology can 1) articulate the essential constructs, epistemologies and methodologies of each discipline suggested as a contributor to learning engineering and then 2) determine the overlaps and gaps between and among constructs to identify the specific essential constructs that make this new discipline unique.
5. Instructional, learning and learning experience designers who are curious about the opportunities

that learning engineering offers can prepare themselves for possible future explorations by developing skills in data analysis and learning more about techniques of predictive analytics, machine learning and deep learning. They will also benefit by exploring the thinking behind modeling and prototyping, the utility of rigorous measurement techniques, the importance of effective instrumentation for data collection and analysis, the methodologies of continuous formative evaluation and A/B testing and the role that learning technology standards plays.

Application Questions

1. You see a job announcement from a well-recognized online university looking to hire a learning engineer. This job will support pilot projects developing software designed to help improve student achievement in math. As you read the job description, it sounds enough like an instructional design position – they talk about analysis, design and evaluation – that you decide to apply. Given that the words analysis, design and evaluation may mean different things to engineers than they do for instructional designers, how will you determine if this job is right for you?
2. You decide to ask ChatGPT for advice about whether your skills match those expected of learning engineers. What are the prompts you would write to ask ChatGPT to determine if your skills are the right skills? Should you apply for a learning engineering job when you have instructional designer skills?
3. How will you evaluate the response that ChatGPT gives you so that you have enough confidence in what it generated from your prompts that you feel prepared enough to willingly engage in conversations with subject matter experts?

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SECTION **V**

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Performance Improvement



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The Role of Human Performance Technology in Learning Design

Jill E. Stefaniak and Lauren Bagdy

In today's world, the role of the instructional designer (ID) is varied and ever-changing. One commonality that exists among all IDs is that our work is intended to facilitate learning and improve performance. While the instructional design process includes activities such as needs assessment and evaluation, IDs may find it challenging to apply these activities due to the substantial demands associated with design and development tasks. Throughout the last several decades, our field has recognized human performance technology (HPT) as an area of study to help individuals working to improve performance and understand the bigger picture of the system in which they work.

HPT, sometimes used interchangeably with human performance improvement (HPI), focuses on improving human performance within an organization. For example, a manufacturing company may discover that several of its employees are not wearing appropriate personal protective equipment while completing certain tasks on the floor and would like to have all of them do so. Or a school district may decide that they want their teachers to make more and better use of the new educational technologies that have been made available to them. Both examples describe situations in which an organization is seeking to improve the performance of the people working in that organization.

While there have been several different definitions of HPT/HPI that have been crafted by scholars in the field, we prescribe to Pershing's (2006) definition that "human performance technology (HPT) is the study and ethical practice of improving productivity in organizations by designing and developing effective interventions that are results-oriented, comprehensive, and systemic" (p. 6). Within this definition, HPT includes the process of diagnosing current situations and identifying opportunities to improve performance. It emphasizes the people that make up organizations, the activities they engage in, the creation of measurable outcomes, and the application of systematic and

systemic approaches to solve problems (International Society for Performance Improvement, 2002).

If we were to compile a list of IDs' projects, we would be able to categorize them according to need. If we were to ask the IDs *why* they were asked to design a solution, they would more than likely share that an instructional solution was developed to fix a recurring problem within their organization. They may also share that an existing instructional program was in place but required some updating due to changes within the industry or organization. Lastly, the instructional program may have been created as a part of a brand-new initiative being launched.

While we do not necessarily have conversations with clients where we would classify instructional design projects as solutions to problems, quality improvements, or growth opportunities, it is helpful for IDs to think about what is driving the need for the instructional solution that is being requested. This helps the ID to look at the bigger picture that an HPT lens provides and identify what additional information and resources may be needed for the project.

Projects benefiting from HPT strategies fall under three categories: problems, quality improvement, and growth opportunities (Pershing, 2006). The same can be said for instructional design projects. Typically, when an organization has identified a need that warrants a solution (instructional or non-instructional), that need will fall under one of the aforementioned categories. A manufacturing company may discover that several of its employees are not wearing appropriate personal protective equipment while completing certain tasks on the floor and would like to have all of them do so. This would constitute a problem warranting a time-sensitive intervention. A sales department may decide that it wants to invest in updating training materials that were created ten years ago to review current marketing standards and needs as a quality improvement initiative. A school district may decide that they want their teachers to make more and better use of the new educational technologies that have been made available to them. This could be considered an opportunity for growth, as the project is not rooted in addressing a performance problem.

It is important to note that instructional solutions are only successful when solving instructional problems. Not all HPT problems will warrant instruction; however, an instructional intervention may be used as part of an HPT solution. IDs can leverage HPT practices to examine the organization or system they are designing within to gain a better understanding of the relationships between people and processes that comprise the system (Foshay et al., 2014; Fox & Klein, 2003; Stefaniak, 2020a, 2023). Throughout this chapter, we will provide an overview of common activities that fall within HPT practices, offer a synopsis of the International Society for Performance Improvement (ISPI) standards, and discuss where HPT and instructional design converge and diverge.

THE FOUNDATIONAL ROOTS AND EVOLUTION OF HUMAN PERFORMANCE TECHNOLOGY

Several different disciplines that have contributed to the theoretical origins of HPT include psychology (behaviorism), systems thinking, instructional design, and organizational development (Sanders & Ruggles, 2000; Van Tiem

et al., 2012). With a large emphasis on HPT being focused on improving human performance, many aspects of HPT displayed characteristics of behaviorism through predicting behavior and designing interventions that emphasized behavioral reinforcement to enact change.

Instructional systems design began gaining traction in the 1940s and 1950s in response to war efforts to train thousands of soldiers and those supporting their work at home in their absence (Reiser, 2001; Saettler, 1990). It was during this time that systematic processes for designing instruction emerged to create instruction in a timely and consistent manner. Earlier instructional and performance interventions were heavily influenced by behaviorism. Behavior-based interventions were designed to enhance performance productivity.

In the 1970s, the fields of instructional systems design and HPT both experienced a shift from behaviorism to a more comprehensive performance-focused paradigm. This was a result of practitioners recognizing the need to address contextual factors and organizational challenges that were impacting the implementation of interventions. It was during this time that both fields began designing models to provide prescriptive guidance on implementing interventions.

One of the earliest, and perhaps the first, notable HPT model was the Behavior Engineering Model developed by Thomas Gilbert (Table 18.1). This model provided a systemic framework to examine performance problems within organizations, taking into account how various components (people, processes, resources) of the organizational system interacted with other components in the system. The Behavior Engineering Model emphasizes the need

TABLE 18.1 Gilbert’s Behavior Engineering Model

Stimulus	Response	Consequences
Environment Information • Description of what is expected of performance • Clear and relevant guides on how to do the job • Relevant and frequent feedback on the adequacy of performance	Environment Resources • Tools, resources, time, and materials designed to achieve performance needs • Access to leaders • Sufficient personnel • Organized work processes	Environment Incentives • Adequate financial incentives contingent upon performance • Non-monetary incentives • Career development opportunities • Clear consequences for poor performance
Individual Knowledge • Systematically designed training to match the requirements of exemplary performers • Opportunity for training	Individual Capacity • Match between people and position • Good selection processes • Flexible scheduling to match the peak capacity of workers • Prostheses or visual aids to augment capacity	Individual Motives • Recognition of worker’s willingness to work for available incentives • Assessment of worker’s motivation • Recruitment of workers to match the realities of work conditions

for practitioners to seek alignment between organizational infrastructure and employers (performers) within the organization. Ideally, HPT interventions to improve performance would be designed under the consideration of how individuals and processes were positioned within the organization. An example could be an instructional design team developing a leadership training program for an organization. In addition to developing the instruction, it would be important to ensure that policies and procedures are in place that align with the leadership strategies that are being taught. Additionally, the organization could use the training program for employees' career development and performance plans. The Behavior Engineering Model helps to ensure alignment between the individual (performer), processes, and overarching organizational goals.

Three boxes examining information, resources, and incentives comprise the Environment level of Gilbert's (1978) Behavioral Engineering Model. The Information box represents the critical role of ensuring that individuals have access to the necessary information and data they need to perform their tasks effectively. It includes providing clear instructions, guidelines, and relevant content to support desired behaviors and outcomes within an organization. The Resources box focuses on the physical and material resources required for individuals to carry out their tasks. This box includes the provision of tools, equipment, technology, and other essential resources necessary for achieving performance goals and objectives. In the Incentives box, the model addresses the motivational aspects of performance. It involves understanding and implementing various incentives and rewards to encourage individuals to engage in desired behaviors and achieve their performance objectives. This can include financial rewards, recognition, promotions, or other forms of motivation.

The Individual level comprises individuals' knowledge, capacity, and motives to perform. The Individual Knowledge box pertains to the cognitive aspect of performance. It emphasizes the importance of ensuring that individuals possess the requisite knowledge, skills, and training to perform their tasks competently. Training programs, educational resources, and skill development fall under this category. The Individual Capacity box addresses the physical and psychological capabilities of individuals. It encompasses aspects such as physical health, mental well-being, and the capacity to handle the demands of a job. Organizations must consider how these factors impact an individual's ability to perform effectively. The Individual Motives box emphasizes the intrinsic and extrinsic motives that drive individuals to perform their roles. Understanding what motivates employees, such as personal goals, job satisfaction, or career aspirations, is essential for shaping performance and aligning it with organizational objectives.

Gilbert's Behavior Engineering Model (1978) has influenced several other HPT frameworks used by practitioners to examine organizational performance. Rummler and Brache (2013) expanded upon Gilbert's six boxes by further dissecting the components of an organization into nine boxes distributed across three levels of an organization (organizational level, process level, performance level). This additional layer allows practitioners to examine the extent to which processes and performance are contributing to the organization's vision, mission, and strategic goals. Both frameworks have been developed to provide a systemic tool to support the design and implementation of interventions that are systemic and results-oriented.

The overall process of employing an HPT strategy in an organization is grounded in systems thinking. HPT considers the systematic and systemic

implications of solutions proposed to a system. Systems thinking takes a holistic approach to viewing an organization or situation to understand the elements that comprise that system (Bertalanffy, 1968; Cabrera et al., 2018). Most HPT and instructional design interventions will often require a combination of instructional and non-instructional solutions. To design sustainability solutions to improve performance, IDs must understand the implications that will accompany the instructional solutions they design and implement (Foshay et al., 2014; Stefaniak, 2023).

Lastly, organizational development has served as a theoretical foundation for HPT, building upon systems thinking to manage change (Van Tiem et al., 2012). Organizational development intersects with many HPT practices, such as engaging in thorough analysis, to diagnose organizational performance problems to make data-driven recommendations. Other areas that are emphasized through organizational development include studying team dynamics, work design, organizational culture and politics, and performance feedback systems (Cummings & Worley, 2019).

COMPONENTS OF THE HPT PROCESS

Similar to instructional design, several HPT models exist for practitioners to choose from depending on the needs of the project. Wilmoth et al. (2010) created categories to classify HPT models according to type: diagnostic, process, and holistic, as depicted in Table 18.2. Diagnostic models guide practitioners in areas to consider when surveying an organization for performance gaps and opportunities for improvement. Process models provide prescriptions to practitioners to support their abilities in applying HPT strategies to an environment. Process models share five common characteristics: they are linear or sequential, have phased or grouped activities, are driven by a gap analysis, are intervention-oriented, and contain a feedback mechanism (Rosenberg et al., 1992; Wilmoth et al., 2010).

TABLE 18.2 Overview of HPT Models (Wilmoth et al., 2010)

Classification	Description	Examples
Diagnostic	A model that informs where HPT can be applied.	Mager and Pipe’s (1984) Performance Analysis Flow Chart Rummler’s Nine Performance Variables (Rummler & Brache, 2013) Deterline’s Performer-Centered HPT Model (Whiteside, 1998) Wile’s (1996) Synthesized HPT Model Tosti and Jackson’s (1997) Multiple Levels The Language of Work Model (Langdon & Marrelli, 2002)
Process	A model that provides prescriptive guidance for how HPT can be applied.	Traditional HPT Process (Van Tiem et al., 2012) Human Performance Model (Atkinson & Chalmers, 1999)
Holistic	A nonlinear framework that possesses unique modeling characteristics.	3-Dimension HPT Model (Stock, 1996)

The International Society for Performance Improvement (ISPI) developed a comprehensive and systematic model that is diagnostic and process-oriented. The model guides practitioners through the various phases of a performance improvement process: 1) performance analysis of need or opportunity; 2) intervention selection, design, implementation, and maintenance; and 3) evaluation (Van Tiem et al., 2012). These phases are described in the following sections.

Performance Analysis of Need or Opportunity

A needs assessment is a systematic process that determines the gap between the current state and desired outcomes in an organization (Altschuld & Kumar, 2010). Needs assessments are typically conducted for three purposes: 1) to address a recurring problem that has been identified within an organization, 2) to identify strategies to improve the quality of existing organizational practices, and 3) to identify opportunities for growth and expansion (Stefaniak, 2020b). The processes of a needs assessment include identifying the problem, identifying data sources to explore the problem, collecting data, analyzing data, and presenting recommendations. The outcome of a needs assessment is the development of an awareness of the gap that should be addressed. Throughout this process, it is important to gather information from multiple data sources to understand the inner workings of the organization. When conducting a needs assessment, regardless of its scale, we should pose questions that enhance our capacity to improve effectiveness, efficiency, and the ease of the learning process (Stefaniak, 2023, p. 40).

Once the gap is identified in the needs assessment, a needs analysis is conducted to examine the factors that contribute to the gap. It is important to note that the terms *needs assessment* and *needs analysis* should be differentiated. While a needs assessment identifies that a gap exists, a needs analysis uses data to understand what is contributing to or causing that gap (Stefaniak, 2020b). From an instructional design perspective, instructional interventions must be designed to intentionally mitigate the performance gap that has been identified through needs analysis.

When the underlying causes of a problem require further investigation, a needs analysis will result in a causal analysis. A causal analysis determines why specific problems exist. In addition to examining the skills, knowledge, and attitudes of the employees, IDs must also consider environmental supports like training and resources for employees (Gilbert, 1978; Harless, 1973).

When a gap is related to performance, a performance analysis is conducted to identify the performance problem. The focus of performance analysis is to determine why individuals or processes are not meeting expectations (Harless, 1973; Rummler & Brache, 2013). When conducting a performance analysis, an ID determines whether the performance gap can be resolved by training or if it requires a non-instructional intervention.

Intervention Selection, Design, Implementation, and Maintenance

The ID's role in a project is to ensure that the approach selected to address a performance problem is efficient and effective. Van Tiem et al. (2012) define interventions as "deliberate, conscious acts that facilitate change in performance"

(p. 195). IDs often focus on instructional interventions as performance solutions. However, instructional interventions can only solve instructional problems. Therefore, IDs must also consider non-instructional interventions to improve performance. Non-instructional interventions contribute to establishing infrastructure within an organization (Klein & Fox, 2004; Stefaniak, 2020b; Sugar, 2014; Van Tiem et al., 2012). In an organizational context, infrastructure refers to foundational support systems and resources needed to facilitate organizational goals and objectives. Stefaniak and Bagdy (2023) identified and described five categories of non-instructional strategies commonly used by IDs to help solve performance problems: job analysis, organizational design, communication planning, feedback systems, and knowledge management. Each of these is described in the following paragraphs.

Job analysis refers to the process of determining the specific knowledge, skills, and abilities required for employees to perform the tasks outlined in their job description (Fine & Getkate, 2014). If a job analysis is either outdated or incomplete, then misalignment between existing training materials and the desired performance outcomes is likely. Moreover, a job analysis may reveal that instruction is not an adequate solution to a performance problem, that organizational design, described next, is also necessary. IDs can also support organizations with job analysis efforts by recommending task analysis, a systematic process used to break down tasks into smaller, more manageable sub-tasks (Jonassen et al., 1999).

Organizational design involves the identification of the organizational components (e.g., roles, responsibilities, processes, procedures) necessary to achieve its performance goals and objectives (Burton et al., 2015). To promote organizational design, IDs can recommend establishing workflow processes, change management strategies, and knowledge management systems.

Workflow processes encompass a set of strategies and steps necessary to complete tasks and activities in order to achieve a specific outcome, and often results in suggestions for changing the workflow processes within an organization. For example, if management at a movie theater conducted a workflow analysis to look at their ticketing and concession stand operations, procedures could undergo several changes to improve operational efficiency and customer satisfaction. For instance, the analysis may prompt the theater to implement self-service kiosks for ticketing and digital menus at the concession stand to reduce wait times. Staff scheduling and training might be adjusted to align with peak traffic hours, and cleaning and maintenance procedures could be optimized to minimize disruptions during movie showings.

When an ID is employed by a prominent training and development firm, the examination of workflow processes frequently reveals opportunities for modifying these processes. For instance, the analysis may reveal existing time-frames for completing high-level design documents, their subsequent client reviews, as well as guidelines governing the allocation of time for design, multimedia development, and pilot testing.

Change management strategies are approaches that organizations may use to enact change. When an organization is prepared to undergo transitions related to organizational structure, process improvements, restructuring, or the integration of new technology, IDs often suggest strategies the organization might employ to make it more likely that the employees within the organization adopt the change that the organization would like to implement.

Change management strategies that are used regularly in instructional design projects include updating stakeholders on the status of projects, engaging leadership, and establishing transparency. IDs can create clear and compelling communication materials, such as emails, videos, or presentations, to convey the rationale behind the changes, their benefits, and the specific steps employees need to take. Two-way communication channels should be established to address concerns and provide a platform for feedback. Another way IDs can support change management is by providing ongoing support, resources, and access to experts ensuring that employees have the tools and assistance they need to successfully navigate and embrace the changes.

Knowledge management systems are the most recognizable non-instructional interventions within organizations. Knowledge management systems collect, organize, and leverage organizational knowledge to improve processes, decision-making, and ultimately, performance. Knowledge management systems often serve as a means for document repositories, providing employees with space to store, share, and access important documents pertaining to organizational policy, annual reports, training manuals, and other important resources to support performance in the organization. These systems are also designed to support individuals' efficient retrieval of information through the design of search engines and advanced search filters. Additionally, knowledge management systems support organizational decision-making with the use of data analytics and knowledge dashboards that provide performance metrics to inform how an organization is performing in relation to their strategic goals.

Communication planning requires developing strategies and processes to improve the dissemination, reception, and understanding of communications within an organization. Communication planning ensures that messaging is clear, consistent, and aligned with organizational goals and objectives. Examples of communication planning as non-instructional interventions include internal newsletters, listservs, and employee feedback systems.

As non-instructional interventions, feedback systems implement data-driven practices that inform employees about their performance in their respective roles. To assess performance and offer feedback, IDs often encourage the implementation of Gilbert's (1978) Behavior Engineering Model. When an organization collects data to learn more about performance at the performer and organizational level and uses the Behavior Engineering Model to organize data, they can deliberate with key stakeholders on areas that may warrant additional resources and support. This model is useful for performance improvement within organizations because it examines performance at both the individual and organizational levels. In addition to Gilbert's (1978) Behavioral Engineering Model, instructional designers can recommend feedback systems like project management software (e.g., Monday.com, Microsoft Project, Airtable, or Trello) and performance feedback systems (e.g., 360-degree feedback and performance reviews).

IDs must consider interventions that extend beyond traditional instructional interventions. Non-instructional interventions play an essential role in improving organizational performance. By considering both instructional and non-instructional interventions to performance problems, IDs contribute to the establishment of a robust organizational infrastructure that addresses these problems and facilitates change.

Evaluation

Evaluation is a critical component of the HPT process, helping HPT professionals determine the effectiveness and efficiency of performance improvement solutions. Evaluation occurs in various phases of an HPT project. Formative evaluation is the iterative process of assessing and improving performance solutions before the implementation phase to ensure they meet the performance objectives. HPT professionals use summative evaluation to determine the impact of a performance solution after implementation, meaning did the performance solution meet the performance objectives? Finally, confirmative evaluation is a continuation of summative evaluation (Morrison et al., 2013) and typically takes place six months to a year after implementation (Hellebrandt & Russell, 1993). Confirmative evaluation is conducted of both the learners and the performance solution to determine if the learners have maintained the desired performance and if the performance solution is still effective.

There are various methods that HPT professionals use in evaluations to gather and analyze data so they can make informed decisions about performance improvement solutions. For example, HPT professionals use data from surveys, questionnaires, interviews, and focus groups to gather feedback from multiple stakeholders about knowledge, skills, and attitudes (KSAs) related to a performance solution. They may also conduct observations of employees to determine if and how they are implementing the skills and knowledge from a performance improvement solution. An HPT professional will select a method (or combination of methods) that best answers their evaluation questions to determine the level of impact their interventions have made to improve performance in the organization (Guerra, 2008).

OVERVIEW OF ISPI'S STANDARDS

The origins of HPT can be traced back to the mid-20th century, and the field has quickly evolved. This rapid transformation prompted researchers and professionals to identify the essential skills and knowledge necessary to be a successful HPT professional. However, there was a need for consistent standards to be used by HPT practitioners and HPT educators (Stolovitch et al., 1999). This need was fulfilled by the International Society for Performance Improvement (ISPI), a non-profit, professional association devoted to the performance improvement of individuals and organizations. ISPI generated ten standards for practitioners to use as a framework for guiding and assessing performance improvement endeavors within organizations (ISPI, 2002):

- Standard 1: Focus on Results or Outcomes
- Standard 2: Take a Systemic View
- Standard 3: Add Value
- Standard 4: Work in Partnership with Clients and Stakeholders
- Standard 5: Determine Need or Opportunity
- Standard 6: Determine Cause
- Standard 7: Design Solutions Including Implementation and Evaluation
- Standard 8: Ensure Solutions' Conformity and Feasibility
- Standard 9: Implement Solutions
- Standard 10: Evaluate Results and Impact

The first four performance standards, often referred to as RSVP (Results, Systemic View, Value, Partnership), are considered fundamental principles because they apply to every phase of a performance improvement project. The remaining performance standards represent the systematic process followed by competent performance improvement practitioners. Table 18.3 shows examples of how these standards can be used, and are often used, by an ID.

In summary, ISPI played a pivotal role in meeting the need for standardized practices by establishing the ten standards that guide performance improvement efforts. These standards highlight the importance of systems thinking and collaboration. Providing a structured framework, the ISPI Standards guide IDs to address organizational challenges and promote performance improvement.

TABLE 18.3 ISPI Standards and Examples

ISPI Standard	Example
Standard 1: Focus on Results or Outcomes	Assist clients and stakeholders with articulating measurable goals and objectives.
Standard 2: Take a Systemic View	Encourage clients and stakeholders to consider the organization and its subsystems when proposing performance solutions.
Standard 3: Add Value	Present cost, risk, and success factors associated with proposed performance solutions, facilitating the selection of the solution that offers the highest added value.
Standard 4: Work in Partnership with Clients and Stakeholders	Establish relationships with the client and stakeholders and include them throughout the project.
Standard 5: Determine Need or Opportunity	Promote data-driven decision-making when determining performance gaps.
Standard 6: Determine Cause	Conduct a thorough investigation of the performance gap, considering environmental and individual factors.
Standard 7: Design Solutions Including Implementation and Evaluation	Use best practices to plan the design, development, implementation, and maintenance of the performance solution.
Standard 8: Ensure Solutions' Conformity and Feasibility	Oversee performance solution development, pilot testing, and subsequent improvements before implementation.
Standard 9: Implement Solutions	Support clients with implementation and change management.
Standard 10: Evaluate Results and Impact	Collaborate with clients to select measures of impact and effectiveness of the performance solution.

HPT AND INSTRUCTIONAL DESIGN: CONVERGENCE AND DIVERGENCE

While HPT and instructional design share the common goal of improving performance within organizations, they are sometimes viewed as two distinct fields. However, in the past 20 years or so, many IDs have employed the HPT practices described in this chapter, so some may feel that this distinction is no longer accurate. However, given that the fields have been viewed, at least historically, as distinct, it is useful to describe what are sometimes considered to be the primary differences and similarities between the two fields. In particular, while HPT takes a broad systemic approach to improve performance, instructional design has traditionally focused on designing instructional solutions (Foshay et al., 2014). While instructional solutions are strategies used in HPT, non-instructional interventions are also considered in HPT. Sometimes, a non-instructional intervention (or interventions), rather than an instructional one, may be able to solve a performance problem. In many cases, instructional interventions are often accompanied by non-instructional interventions to ensure a successful integration into the organization.

Although they might be viewed as different fields, HPT and instructional design share four commonalities: evidence-based practices; goals, standards, and codes of ethics; systematic and systemic processes; and formative, summative, and confirmative evaluations (Foshay et al., 2014). These are described next.

Evidence-based practices are common across the fields of HPT and instructional design. In HPT, professionals conduct organizational analyses to identify and evaluate performance across multiple sources within an organization. By conducting a thorough analysis of organizational performance, HPT professionals can make informed decisions to drive performance improvement. In instructional design, professionals systematically analyze learners to ensure that instructional materials are tailored to their specific needs. Additionally, learner assessment is used in instructional design to ensure that instructional materials meet the needs of the learners.

Both fields are guided by professional organizations that establish goals, standards, and codes of ethics. In HPT, professionals ensure that interventions align with the goals of an organization. In instructional design, professionals generate clear, measurable objectives to determine what learners should accomplish as a result of the training program. Additionally, HPT professionals follow standards and participate in certification programs offered by ISPI and the Association for Talent Development (ATD). Instructional design professionals are guided by standards for learning and performance generated by the International Board of Standards for Training, Performance, and Improvement (IBSTPI), the Association for Educational Communications and Technology (AECT), and ATD.

Systematic and systemic processes are employed in both the HPT and instructional design fields. Both HPT and instructional design professionals leverage systematic models and frameworks. HPT professionals use these systemic processes to analyze performance at various levels within an organization, while IDs use these processes to guide design across various contexts. As a foundation of the field, HPT practitioners apply a systems lens to assess performance issues across an organization. In modern instructional design

practices, professionals are encouraged to adopt a systems thinking approach (Ackoff, 2006) to examine individual components within a larger system to solve organizational problems.

Finally, both fields use formative, summative, and confirmative evaluations. An HPT professional implements several evaluation methods to measure individual and organizational performance, while instructional design professionals use multiple assessments before, during, and after the design process to evaluate the effectiveness and efficiency of a training intervention.

It is also important to note that while several instructional design journals publish articles on trends related to performance improvement, several journals focus primarily on matters related to HPT. These include *Performance Improvement Journal*, *Performance Improvement Quarterly*, *Human Resource Development Quarterly*, *International Journal of Training and Development*, *Journal of Workplace Learning*, and *TD (Training + Development)*.

Although HPT and instructional design are different fields, they share a common goal of improving performance in organizational settings. These commonalities described earlier call attention to the similarities of HPT and instructional design as they work in tandem to address complex performance challenges and contribute to the success of an organization.

Summary of Key Principles

1. HPT takes a thorough approach to improving organizational performance, considering not only instructional solutions but also non-instructional interventions.
2. Systems thinking is a fundamental concept in both HPT and instructional design, as it encourages professionals in these fields to view organizations and performance challenges as interconnected systems, enabling them to develop holistic and effective solutions.
3. While HPT and instructional design are sometimes viewed as distinct fields, they share commonalities such as evidence-based practices, ethical standards, systematic processes, and evaluation methods, making them complementary approaches to enhancing performance.
4. Performance analysis in instructional design involves a systematic examination of individual or organizational performance gaps to determine whether instructional or non-instructional solutions are needed to improve outcomes.
5. HPT plays a pivotal role in designing sustainable solutions by emphasizing a systemic and comprehensive approach that not only addresses immediate performance issues but also considers the long-term impact on organizational productivity and effectiveness.

Application Questions

1. Imagine that you are an HPT consultant and your next client is a large e-commerce organization. The organization is experiencing performance problems at a warehouse that serves as its South-eastern hub for the United States. The findings of your analyses

show that there are issues related to employee motivation, morale, and efficacy, which have resulted in low productivity and high employee turnover. Traditionally, the organization relies on training; however, you know that relying on instructional interventions may not address performance problems related to motivation and morale. What are some non-instructional interventions you can recommend to your client?

2. Practice your HPT elevator speech!
An elevator speech is a clear and

concise statement of what you do or who you are. The term “elevator speech” derives from the idea that you should be able to deliver your statement in a short elevator ride, typically under one minute. You must quickly and effectively communicate your main points while keeping the listener(s) engaged. What would your elevator speech be as an HPT professional? Generate an HPT professional elevator speech, indicating what you do as an HPT professional in one minute or less.

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Informal Learning

Saul Carliner

Informal learning happens when a person visits a museum exhibition about a subject of interest that they have not yet had much opportunity to study.

Informal learning also happens when a person goes online to investigate a medical condition associated with a recent diagnosis.

Informal learning happens, too, when Microsoft 365 users view videos on YouTube about how to effectively prepare and deliver onboarding materials for new workers.

Informal learning happens when new instructors manage their first difficult students in the virtual classroom.

Informal learning occurs when managers coach their workers on how to handle unexpected challenges in the workplace.

Informal learning also happens when a worker suggests a procedural change to five different managers – and each says no.

But what is informal learning?

In this chapter, I provide an explanation. After defining informal learning and placing current interest in the subject among instructional designers into context, I describe opportunities for informal learning and considerations about the manner in which it happens and close by suggesting how instructional designers can support informal learning in the organizations where they work.

ABOUT INFORMAL LEARNING

This section provides a general background on informal learning. In it, I first define the term in general and then in the context of the workplace. Next, I suggest some of the motivations for recent interest in the topic and close by identifying the most common forms of informal learning, especially in a work context.

Defining Informal Learning

Many definitions of informal learning focus on its learner-controlled nature. For example, in our 2005 book *Advanced Web-Based Training: Unlocking*

Instructionally Sound Online Learning, Margaret Driscoll and I define it as a process in which learners set their own learning objectives and determine for themselves what successful completion looks like. This contrasts with formal learning, in which an instructor or instructional designer establishes the objectives and establishes a means to determine the criteria for successful completion (Driscoll & Carliner, 2005).

Such definitions suggest that formal and informal learning are distinct from one another. However, as indicated by Victoria Marsick (2009), one of the leading researchers on informal learning, oftentimes “informal and formal learning interacts in important ways.” In other words, oftentimes an informal learning activity includes some elements of formal learning. For example, a new employee might learn how to greet customers and operate the cash register through a series of on-the-job activities without going to a formal class. In some sense, the learning is informal because it happens at the learner’s convenience and at the learner’s speed. But it is not completely informal because the employer determines the outcomes and designed a series of activities to facilitate learning.

In the workplace, learning activities that many label as “informal” have some somewhat formal characteristics. In fact, the British government enlisted researchers Janice Malcolm, Phil Hodgkinson, and Helen Colley in 2003 to define informal learning. Their resulting definition likened informal learning to a series of levers, each providing a different type of control over the learning process. These “levers” include:

- **Process:** who controls and assesses learning. In the most formal situations, learning is controlled and defined by the instructor, who establishes objectives and, through assessments, determines whether learners have achieved the objectives. In the least formal situations, learners establish their own objectives and criteria and determine when the learning is complete.
- **Location:** where the learning occurs. In the most formal situations, learning occurs in a place intended for learning, such as a traditional or virtual classroom. In the least formal situations, learning occurs organically within the context of everyday life.
- **Purpose:** whether learning is a primary or secondary goal of the learning activity. In the most formal situations, learning is the primary goal. In the least formal situations, learning is an accidental by-product.
- **Content:** whether the topic of study is for immediate or long-term use. Acquisition of a body of content – such as the concepts underlying an occupation – tends to have long-term use and is considered more formal, while content about processes and procedures within a particular context has more immediate impact on the job – and in job performance – and is considered more informal.

In 2008, Christine Wihak and her colleagues, working on a similar project for the Canadian government, added a fifth “lever”:

- **Consciousness:** the extent to which learners are aware that learning has occurred. In the most formal situations, learners have a high level of awareness that learning has occurred (or that it should have occurred). In the least formal situations, learners may not even realize that they learned something until long after the experience.

This extended definition builds on the earlier notion that informal learning is linked to formal learning. It also encompasses a number of particular learning processes, including non-formal learning, which covers instruction that occurs in locations other than schools, universities, and the workplace; incidental learning, which refers to insights and facts unexpectedly gained through interactions with other people and experiences; and self-directed learning, which refers to an educational process that is carried out by the learner under a formal agreement with a mentor or instructor.

Motivations for the Recent Interest in Informal Learning

Admittedly, informal learning has existed as long as humans have passed knowledge from one person to another – intentionally and otherwise. Furthermore, researchers have explored various aspects of informal learning for well over a century. For example, museum researchers have explored ways that visitors learn from museum exhibitions and educational researchers have explored ways that individuals learn on their own.

But interest in the subject has noticeably risen in the past 20 to 30 years. The interest comes from four drivers. First, practicing instructional designers drive interest in the concept. The adoption of the performance improvement paradigm (described in depth in the previous chapter) that emerged in the 1980s and 1990s (Stolovitch & Keeps, 1992) by most training groups generated interest in transfer of training to the job. Often, transfer of training focuses on the application of material learned in a formal class to the job. However, a preponderance of research evidence suggests that successful transfer results from providing a variety of informal learning opportunities and supports in the workplace so learners receive practice and feedback as they attempt to apply skills taught in the classroom in the “real world,” thus helping learners to expand the base of skills started in the formal class. Informal learning plays a central role in effective transfer, as workers receive guidance and coaching on their attempts to apply skills in the workplace, build confidence through repeated successes in the workplace, and expand the scope of work they can handle by observing co-workers and through online resources, such as reference and user materials, follow-up tutorials and performance support systems. Performance support systems (Carliner, 2002; Gery, 1991) are collections of resources that assist workers with the implementation of tasks on the job. In some cases, the systems perform tasks for workers; in others, the systems guide workers in performing the tasks. Informal learning plays a central role in effective performance support, too.

A second driver of interest in informal learning among instructional designers is the rise of the Internet, which provides workers with access to extensive repositories of information. In addition, social media – especially discussion boards and groups on social networking sites like LinkedIn – connect workers so they can exchange tips and techniques and, in the process, learning. As a result of such developments, instructional designers posit that workers are increasingly learning on their own (Cross, 2011).

A third driver of interest in informal learning among instructional designers has been the popularity of the 70–20–10 concept (TrainingIndustry.com, n.d.), which posits that 10 percent of all learning for the job

happens through formal instructional programs, 20 percent through coaching and mentoring, and the remaining 70 percent individually and on the job. Although the promoters – who run a consulting practice rooted in this concept – claim that the concept is rooted in the work of Lombardo and Eichinger (1996) from the Center for Creative Leadership, that research is rooted in the work of the late Allen Tough (1978), who asked learners to record all of their informal learning, not just work-related. As a result of this, researchers Pedro De Bruyckere et al. (2015) identify the 70–20–10 concept as an urban legend of learning and education, though most practicing professionals still have faith in it. Surveys of practice during the 2000s and 2010s by the Conference Board of Canada peg the actual use of informal learning at closer to 60 percent, with the remaining 40 percent offered formally. Notably, the percentages switched during the 2008 economic downturn and did not recover when the economy did in the subsequent decade (Hall & Cotsman, 2018).

But the fourth, and perhaps most significant, driver of interest in informal learning among instructional designers is the rise of dynamic, knowledge-based work. In addition to connecting users, computers provide decision makers with information more quickly, and with a pinpoint focus not otherwise feasible. This, in turn, has helped organizations develop sophisticated business strategies that let them better target their activities and respond more quickly to external events. This, in turn, has led to more flexible work assignments: (a) flexible work teams that bring together people with the expertise needed on a particular project and then disband when workers have completed the project and (b) shorter product development cycles (projects that once took one to five years now take three months to one year). This flexibility demands that workers become productive more quickly on projects. Because of the general challenge of scheduling formal classes in a timely way and, even when that's feasible, the need for highly specialized courses for which few qualified instructors exist, organizations increasingly rely on informal learning to prepare workers for projects. Since the early 2020s, artificial intelligence has increasingly supported knowledge-based work, and the result is an acceleration of the trends just mentioned as well as providing assistance from technology in making decisions, assistance that could be accurate but could also result from hallucinations: information made up by the system. As professionals increasingly rely on artificial intelligence, they also need sufficient subject area expertise to spot hallucinations (Vance et al., 2023; Duin & Pedersen, 2023). Similarly, as artificial intelligence increasingly supports professional decision making, the issues professionals must address become increasingly volatile, uncertain, complex, and ambiguous, or VUCA, a concept and term first documented by the U.S. Army College (U.S. Army and Heritage Center, 2022).

The Most Common Forms of Informal Learning

Although informal learning can take many forms, some appear more commonly than others. In this section I describe those common forms, many of which are designed, developed, or facilitated by instructional designers.

Two categories of informal learning formats exist. The first promotes individual learning, through which people build awareness, knowledge, and

skills on their own. Instructional designers can promote independent learning activities among workers by:

- Preparing case studies. These studies are usually written or video-based descriptions of a particular challenge in a particular context, so people can see how others addressed the challenge and can transfer the knowledge gained to their own work environment.
- Developing content or documentation. These terms refer to many types of informational materials that help workers perform their jobs and that workers usually check on the job, including user's guides, references, reports, and similar materials.
- Designing guided tours and show-me videos. Guided tours provide quick overviews of a topic, familiarizing workers with a subject and helping workers determine whether they need to learn more about it and usually take the form of videos or self-running slide shows. Show-me videos are quick films that show how to perform a task, usually a software-based task.
- Providing lists of tips and tricks. These are suggestions that advise workers on ways to effectively and efficiently use software and other products. These take the forms of articles, videos, podcasts, and pop-ups that appear on screen while working with an application.
- Developing tutorials. These are formal instructional programs that, in the context of informal learning, workers voluntarily take and, when feasible, at the learners' convenience. These tutorials help workers develop and practice skills needed on the job.
- Creating gaming and simulation activities that model a particular environment or challenge (the simulation component) and provide participants with the opportunity to experience the benefits of good choices and the consequences of poor ones in the environment (the gaming component).
- Providing opportunities for on-the-job training (OJT) in which workers perform tasks within the contexts of their everyday job assignments, receive feedback on their performance, and reflect on the experience so they can identify and apply what they learned the next time they perform the task.
- Creating performance support materials, which provide workers with assistance while they do that task.

Preliminary findings from my current research on informal learning in the workplace (at least, current as of the writing of this chapter), which involves asking workers to track their informal learning over a period of several weeks using learning logs, suggests that materials like these play a key role in the informal learning of workers, especially materials developed within the organization.

Two additional powerful forms of individual informal learning usually occur without the involvement of instructional designers. The first is trial and error, in which workers attempt a task until they effectively perform it and, in the process of doing so, determine what they should not do when performing the task. The second is developmental assignments (also called stretch assignments), which give workers new responsibilities within the context of their current jobs and that require the regular use of skills that workers either have

not used or only use occasionally. Developmental assignments integrate many of the other forms of informal learning just mentioned. But managers usually devise developmental assignments for their staffs without the involvement of instructional designers.

The second broad category of informal learning promotes learning among two or more people. In these situations, learning is sometimes a byproduct of events that might or might not have an agenda for learning. To encourage workers to interact with and learn from one another, instructional designers might:

- Coordinate lunch-and-learn programs, typically 60- to 90-minute programs with an educational agenda and that occur in conjunction with a meal, usually lunch (hence the name). Lunch-and-learn sessions typically feature a guest speaker presenting a topic of interest but might also involve a group discussing a topic on its own with a moderator to ensure that the conversation stays on topic.
- Tease out insights arising from meetings about topics other than learning. For example, a meeting leader might end a meeting by debriefing it. During the debriefing, participants might identify new insights or tips that can help them work more effectively.
- Organize seminars, symposia, conferences, and webinars. These formal sessions are intended to provide participants with new insights and ideas either from a guest speaker who is an expert in a topic of interest to participants, a facilitated conversation within a group, or a combination of these activities. Instructional designers often organize the events, recruit speakers and facilitators, and provide them with guidance on what to cover and how to interact with the participants.
- Set up coaching programs, in which workers who recently received new responsibilities perform their work under the guidance of a more experienced worker and receive feedback on that work. Instructional designers often prepare guidance for coaches and tips on providing feedback to learners.
- Moderate communities of practice, groups of people who share a common interest and discuss it together, sometimes through social media groups like a LinkedIn group for higher education instructors or a Facebook page for a professional association for technical writers. These communities provide workers with answers to immediate questions and long-term socialization into a profession or organization, as well as help workers build their networks.
- Develop and coordinate mentoring programs, in which an experienced worker provides ongoing job and career guidance to a protégé by listening to the protégé, helping the protégé devise solutions to immediate and longer-term challenges, offering suggestions and insights and, when feasible, linking the protégé with new opportunities.

The COVID pandemic of 2020–2023, which involved extended periods of lockdown in many jurisdictions, affected informal learning among two or more people. Many of these learning opportunities moved from face-to-face to live virtual settings such as Zoom, Microsoft Teams, and Webex Cisco.

In addition to these types of informal learning among two or more people, preliminary results of my current research suggest one other type of social

activity promotes learning: meetings. In fact, the results suggest that meetings are one of the two most widely used forms of informal learning along with informational materials. Note, however, that most meetings do not require the services of instructional designers.

OPPORTUNITIES AND ISSUES TO CONSIDER REGARDING INFORMAL LEARNING

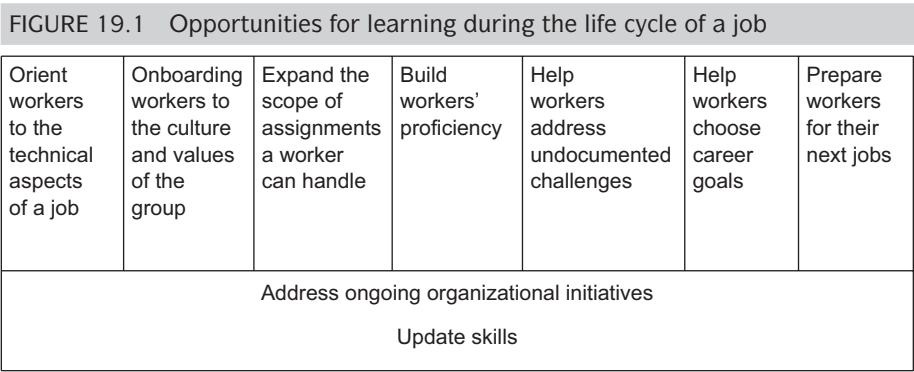
This section first explores opportunities for informal learning, which is when people typically learn in the context of their jobs. Then it describes some characteristics of informal learning to consider when thinking about promoting the use of informal learning within an organization.

Informal Learning Opportunities Throughout the Job Life Cycle

In a study of the ways that people develop expertise in their professions, researcher Michael Eraut (2000) found that the nature of the problems workers encounter changes the longer workers stay in their jobs. Early in their tenures, workers focus on determining which types of problems they need to solve, a process called pattern recognition. As workers become more experienced, the focus changes to understanding the broader situation in which they are working, a process called meta-cognition.

Research like this suggests that the life cycle of the job provides a framework that training and development professionals can use to anticipate the changing learning needs of workers throughout their job life cycles (Carliner, 2012). Life cycle refers to the span of a worker’s tenure in a given position, from the time the worker starts the job until he or she moves on to the next position or leaves the organization. During this life cycle, workers’ problem-solving strategies transition from pattern recognition to meta-cognition. Throughout the life cycle, workers must also address ongoing organizational initiatives, such as change management programs, quality improvement initiatives, and revisions to policies, work standards, products, and processes. Figure 19.1 identifies the key junctures during the life cycle of a job.

Each of the junctures, or phases, in the life cycle of a job presents opportunities for learning. In most phases, external factors drive the learning process, such as when a worker is asked to assume additional responsibilities,



start using a new software program, or adhere to a new policy or procedure. In many of these instances, employers often provide little formal training, so workers have to figure out for themselves how to address these requests. As noted next, informal learning can help develop workers at each of these phases (Carliner, 2012):

- Orienting workers to the technical aspects of a job, such as ringing up a sale or using a special authoring tool to create e-learning programs. During this phase, on-the-job training is usually employed. Ideally the learning is structured and an experienced worker coaches the new worker.
- Onboarding workers to the culture and values of the group, so workers can interact with others in a culturally appropriate manner. Much of this learning happens informally. At its best, formal mentoring and integration into a community of practice facilitates learning. At its worst, workers learn through trial and error.
- Expanding the scope of assignments a worker can handle (such as having a sales representative handle returned merchandise or having an instructional designer develop more complex materials). A variety of informal learning methods, such as tutorials, coaching, documentation, tips and tricks, and communities of practice help workers expand the scope of assignments they can handle.
- Building workers' proficiency, in which workers handle their current job responsibilities more effectively or efficiently. A simple example is moving from menu options to keyboard shortcuts when working with Microsoft Office. The same informal learning methods used to expand the scope of assignments also help workers build proficiency.
- Helping workers address undocumented challenges, such as complex customizations of computer systems and addressing interpersonal problems on work teams. Documentation provides some guidance in these instances, but communities of practice that let experts brainstorm ideas are often most effective at developing these skills.
- Helping workers choose career goals, which workers need to consider when they are ready to start a new job or circumstances compel it. Sometimes workers find their next job through personal study; other times, workers receive coaching and mentoring. In many instances, workers rely on a combination of the two to determine how to proceed in their careers.
- Preparing workers for their next jobs. Once workers decide which jobs they would like to move into, they often require formal learning, including degrees and certification programs. But tutorials taken informally, developmental assignments, coaching, and mentoring can also help workers prepare for their next jobs.
- Addressing ongoing organizational initiatives, such as a switch to a new reservations system. Although these initiatives usually involve the use of an entirely new software to perform old job tasks, they often involve a change to job responsibilities or work processes. Although organizations rely on formal programs to teach workers how to use the new systems and perform job responsibilities and processes, many workers skip the formal learning or resist the change, so organizations rely extensively on informal initiatives, such as promotional messages to encourage people

to try the new systems, responsibilities, and processes, tips and tricks to help workers easily make the transition, and coaches and mentors to help with the interpersonal side of the transition.

- Updating workers' skills and knowledge, in which workers try to perform their jobs using the most recent approaches and technologies. Mentoring and coaching help workers recognize they need to update their skills. Many of the means used to expand the scope of assignments and build proficiency also help workers update skills.

Characteristics of Informal Learning

The framework of the life cycle of a job suggests broad processes of informal learning: that is, what inspires people to learn informally and how they approach the learning at each phase of the job life cycle. A growing body of evidence from empirical studies provides insights into specific characteristics of informal learning and characteristics that affect its success.

IN THE WORKPLACE, INFORMAL LEARNING REQUIRES LEADERSHIP TO MODEL IT AND TO GIVE PERMISSION TO LEARN Studies have found that participation in informal learning is directly influenced by the behaviors of the top leaders of the organization. If top leaders set an example of engaging in informal learning and talking about it with their staffs – that is, modeling the behavior and encouraging their workers to engage in it – workers are more likely to engage in informal learning than if leaders merely suggest doing so. The unexpected results of a study into the informal use of e-learning programs on the job provides some insights into why this modeling is necessary. In that study, workers did not feel that they should be studying on work time, as it was an unproductive use of work time even if the studying directly related to an immediate on-the-job need.

INFORMAL LEARNING DIFFERS FROM INFORMATION SHARING In the course of a day, people share countless factoids – facts and details that might have immediate application but have no long-term benefit (at least, not at the time that users receive these factoids). Factoids are just information. For example, news about a change in leadership in an organization is a factoid.

In contrast, instruction not only tells, but ultimately provides the opportunity to develop knowledge, skills, and attitudes. Knowledge, skills, and attitudes are ultimately demonstrated to third parties who, in turn, assesses whether the learner has developed competence. That's why, when teaching unfamiliar knowledge and skills, formal instruction often explicitly describes and demonstrates the material and provides practice and assessment opportunities to verify that learners have, indeed, acquired the desired knowledge, skills, and attitudes.

Integrating all of these explicit activities into informal learning becomes trickier. In some instances, learners don't need all of that demonstration, practice, and assessment because the new skill is sufficiently similar to the existing skill, in the same way that cutting and pasting text in a software application is similar to copying and pasting text. In other instances, learners only find out whether they have successfully mastered new knowledge, skills, and attitudes by performing them in the real world.

The point is, if learning represents a change in behavior, it only occurs when learners demonstrate a change in behavior; not merely when they become informed of factoids related to that behavior (Carliner, 2012).

INFORMAL LEARNING IS A SOCIAL ACTIVITY Just because learning does not happen in a formally scheduled class does not mean that informal learning needs to be a solitary activity. In fact, some of the most powerful online learning experiences are also social ones. For example, coaches help learners apply complex concepts in practical situations and strengthen performance of tasks. Similarly, mentors provide protégés with insights gained from their lived experience as well as advice tailored to the unique situation of the learner – gained through an ongoing and in-depth relationship.

But perhaps one of the most powerful means of social learning comes through communities. In the work world, they are called communities of practice, a term coined in the early 1990s by Jean Lave and Etienne Wenger (1991). Communities share news and ideas, discuss various ways to perform tasks, and provide support to their members. Communities can exist in face-to-face contexts, such as members of a department and a local actors' union, but increasingly exist online, too, through LinkedIn and Facebook groups, ongoing Twitter events like the long-running weekly chats of instructional designers on #lrnchat, and dedicated websites like learningguild.com. One of the benefits of communities is that they can help members apply ideas that are already documented (such as a particular policy or procedure) into practice, and speed members' development by helping them learn from other members' experiences. Communities are only effective at doing so if members are motivated to participate, the participation benefits the entire group more than it benefits the individual, and the discussions remain civil and relevant.

INFORMAL LEARNING IS NOT ALWAYS EFFICIENT OR EFFECTIVE Although one of the great benefits of informal learning is the deep sense of ownership and pride that people feel in what they have learned, the practical reality is that informal learning is not always an effective or efficient means of learning (Carliner, 2012).

In terms of effectiveness, part of the challenge is that people might not always realize that they need to initiate a learning sequence. In a work context, for example, people might mistakenly believe they are performing a task correctly. This situation exists, in part, because, as Sitzmann et al. (2010) found, most people are often not effective at assessing their own skills and abilities.

In other instances, learners might think they have successfully learned something when, in reality, they haven't. As Kirschner et al. (2006) note in their controversial and widely cited article on minimally guided instruction in formal learning environments, "minimally guided instruction is less effective and less efficient than instructional approaches that place a strong emphasis on guidance of the student learning process" (p. 76). In a study of customer support representatives, for example, researcher Joe Downing (2007) found that they would conduct a Google search to solve customers' problems as quickly as possible. The representatives would suggest one of the first results as the fix to client problems. In many cases, however, the suggestion did not

fix the problem, resulting in repeated calls and increasingly angry clients. The solution to the problem was a prescribed – or scaffolded – protocol to diagnose callers' problems that would solve 80 percent of the problems. If representatives needed to conduct a search after that protocol failed to solve a problem, representatives were trained in methods for conducting the search.

INFORMAL LEARNING IS RARELY TRACKED OR MEASURED Although workers learn informally incidentally or as a job-related necessity, they rarely receive formal recognition for the effort. According to preliminary reports of another informal learning study I am conducting – a survey of informal learning practices among learning professionals in Canada – employers rarely record informal learning events in the official employee records of workers. On a practical level, if the learning happened incidentally, through a conversation or by reading informational materials, the system has no way of identifying the event as a learning event. That creates challenges because workers in licensed fields must often demonstrate that they have completed a certain minimum amount of learning to maintain those licenses and, in other fields, employers often use learning records to recognize the successful acquisition of skills needed for advancement to later jobs.

Although they have not yet yielded an industry-wide way of recognizing skills and knowledge gained through informal learning, some researchers are exploring ways to provide workers for recognition of acquired skills and knowledge (called recognition of acquired competencies, or RAC) (Souto-Otero & Ernesto, 2015) and to track and measure informal learning (Decius et al., 2019; Froehlich et al., 2017).

FACILITATING INFORMAL LEARNING

Although informal learning often happens without the direct involvement of instructional designers, we can provide the framework that makes high-quality informal learning available and support the learning process. In this section, I discuss several ways we can do so.

One way to facilitate informal learning is through technology. A variety of technologies support informal learning. Several categories of technologies do so. These, include computers (desktop and laptop) and mobile devices, tablets, smart phones, and e-book readers. Learners usually prefer one device or another for particular learning tasks. For example, learners might prefer using a desktop computer to practice complex calculations. However, oftentimes learners prefer to learn when the need or mood strikes, so learners will use whatever device is most convenient at the moment.

Several types of media deliver informal learning content to learners. These include:

- Classic or non-computerized media, such as printed materials, class- and meeting rooms, and older recordings on records, film, and filmstrip.
- Core or Web 1.0 technologies, which share text, audio, and video with learners and include websites, online references and e-books, and online tutorials.
- Social media or Web 2.0 technologies, which encourage interaction among individuals (perhaps learners or learners and instructors) and

include social networking sites like LinkedIn and Facebook, micro-blogging sites like Twitter, photo- and video-sharing sites like Flickr and YouTube, and virtual meeting spaces like Adobe Connect and Citrix GoTo Meeting.

- Enterprise learning systems, which distribute materials used for informal learning throughout an organization and track and report informal learning activities. Several classes of enterprise systems exist and include content management systems (which are primarily used to publish materials and track their use), learning management systems (which serve as electronic registrars and also link learners to learning materials), course management systems (which link learners to related materials), and talent management systems (which perform the tasks of a learning management system and digital all other human resource activities within an organization such as payroll and employee information).
- Artificial intelligence, which is in its infancy as of the writing of this chapter but can assist users in locating and summarizing materials on subjects of interest (Vance et al., 2023; Chen, 2023) and is anticipated to provide tutoring in the coming years.

Providing people with access to as many of these technologies as possible helps facilitate informal learning. But more than providing access, the technologies need to be integrated into the work and personal lives of people so that learning occurs as seamlessly as possible. Professionals in our field can advocate for the value of these technologies, develop business cases to help organizations acquire or extend their use, and provide instructional support.

More than technology, however, learning professionals – including, but not limited to instructional designers – can facilitate informal learning in these ways.

Gaining Executive Support for Informal Learning Efforts

As noted earlier, successful modeling of informal learning behaviors by leaders along with formal encouragement of – and permission for – learning informally on the job strengthens informal learning in the workplace. The same concept also applies in other environments. Students are more likely to learn beyond the classroom if the behavior is modeled by the role models in their lives, such as teachers, coaches, and of course, parents.

In workplaces, the training staff are the ones invested in promoting the role of informal learning in the workplace and, therefore, the ones who should take leadership in petitioning top leadership of the organization to publicly demonstrate their support of informal learning. Support comes in several forms, including:

- A statement in support of informal learning activities, which acknowledges that workers learn many aspects of their job informally and indicates that executives support such processes, promotes awareness of informal learning, and encourages workers to participate in it.
- Approval of the use of work time for informal learning activities.
- Approval of funding for proposed projects related to informal learning.
- Sharing their own informal learning experiences with the staff of the organization whenever possible.

Subscribing to External Content to Expand Learning Opportunities

Although ChatGPT and Google both provide access to a lot of information, neither provides access to all information, as most users have learned when they hit a content paywall (that is, when they have to pay to see the content identified by Google). Furthermore, the information that is available for free is faulty: out-of-date, incomplete, or incorrect and, as many users of ChatGPT have learned, hallucinated (that is, made up by the system). Many free resources are actually marketing tools (called content marketing) and might provide incomplete or misleading information.

To facilitate informal learning from the highest-quality content, organizations might therefore need to acquire copyrighted materials. These include:

- Subscriptions to trade and professional magazines and journals.
- Subscriptions to databases that provide access to several trade and professional magazines and journals for a single fee.
- Tuition to individual webinars and online events sponsored by trade and professional associations and private organizations. In many instances, several workers can attend an event for a single registration, and people who register have access to recordings afterwards.
- Subscriptions to online tutorials provided by trade associations, professional associations, and private providers.
- Individual books or series of books.
- Subscriptions to proprietary artificial intelligence services rather than reliance on ChatGPT, Bing, Bard, and similarly free online services.

Because most organizations do not hire a librarian, the training staff usually has responsibility for managing these resources. As a result, learning professionals need to take the responsibility for identifying and subscribing to these materials, promoting their availability, tracking their use, and overseeing renewal of the content.

In addition, learning professionals need to make sure that workers have access to them in the workplace. Many organizations limit workers' use of the Internet, whether for security reasons or to promote productivity. For example, some organizations block external files containing video. As a result, people will not be able to view the subscribed-to materials.

Supporting People in Their Informal Learning Efforts

As noted earlier, although it often happens individually, informal learning is not necessarily a fully independent activity. Learning professionals can support the process in a variety of ways, including:

- When asked (or a need is sensed), helping workers establish or clarify their learning goals and the path toward their goals.
- Linking workers to learning opportunities by identifying learning options and how to take advantage of those options. Formal career development efforts used in some organizations help with this task. So do externally described career paths, which most medium and large organizations establish for their core job skills and many professional associations offer for their professional programs.

- Helping workers develop independent study and research skills. Specific services that learning professionals can provide include readiness assessments, which assess workers' preparedness to conduct independent study; workshops on assessing ones' own skills; workshops on searching for and assessing information on the Internet so workers recognize when the first Google result is useful; workshops on formulating golden prompts for artificial systems to ensure the most relevant and effective results; individualized coaching and tutoring to assist workers should confusion or problems arise when learning informally; and providing signposts so informal learners can chart their progress in the learning process and assess un-ambiguously.

Recognizing Informal Learning

Partly because much of the learning occurs unconsciously, partly because the learning happens slowly over time rather than in a short, concentrated event like a training session, and partly because workers often focus on issues other than learning, the workers and others around them rarely realize that learning occurred, much less what they have learned. At the least, this failure to acknowledge informal learning prevents workers from recognizing how the new lessons affect their current behavior. At the most, this failure to acknowledge informal learning prevents workers from fully realizing the positive benefits, including externally recognized expertise, increased job responsibilities, and promotions.

Formally recognizing informal learning first involves recognizing that learning occurred. This usually occurs through coaching processes, part of which involves coaches helping workers to identify and label what has been learned. Formally recognizing informal learning also involves crediting workers for their acquired expertise. This can occur less formally by updating an education record in an employer's human resources system. The Experience Application Programming Interface (xAPI) refers to programming code that instructional designers can include in e-learning programs, browsers, and other online materials to track materials used by learners, make inferences about competencies developed, and recognize this in employee records. Although few systems currently use such capabilities, industry experts expect emerging Learning Experience Platforms (LXPs) to do so. More traditionally, recognition of acquired skills occurs through certification processes – that is, getting a third party to recognize the acquired expertise – either to provide educational credit such as credit for university courses or to qualify for an external credential such as the Certified Training and Development Professional credential offered by the Institute for Performance and Learning.

Supporting Informal Learning by Fostering Documentation Efforts

If managers and workers plan to leverage informal learning, they need material from which to learn. Although some of this material is "external" to the organization, more of it specifically pertains to the organization in which the

learner works or participates. People typically turn to these types of documents for informal learning:

- Policies, procedures, and processes, which typically exist for individual departments, functions (groups of departments), divisions, and entire organizations (The scope of this material broadens with the broadening scope of the document.)
- Marketing literature about current products and services
- User documents about current products and services
- Service documents about current products
- Planning documents about future products and services
- Service records
- Customer records

But one of the most persistent problems in organizations is that no one has ever documented this content or, if they have, it is inaccessible to workers who need it. In some cases, documents exist but have not been made available to others. They might be stored on the hard drive of an individual worker instead of in a shared folder that all workers can reach. In other cases, the documents are unreadable except to those who prepared them. They use codes and similar shorthand notations that only the author and perhaps a co-worker or two might comprehend.

Because instructional designers often use or adapt this documentation in their formal programs – and, in some instances, create it – they can advocate for the creation of more complete documentation in their organizations as well as develop that content when needed.

Designing Informal Learning Materials for “Findability” and “Usability”

As Marsick and Watkins (1990) noted, many people initiate informal learning activities to solve an immediate problem. But too often, they cannot find the desired material because the people who created it did not consider how people might look for the material and either used different terms to describe it or, more commonly, got buried in material they did uncover but was actually about other subjects. In addition, when people do find the material on the topic they are looking for, oftentimes it remains marginally useful at best because the descriptions fail to take into account the actual use of the material in real-life circumstances.

Designing material so people can easily find it is called designing for “findability.” Designing material so people can easily apply it is called designing for “usability.” The 19 principles of performance-centered design proposed by Gloria Gery in 1995 provide a framework for designing for findability and usability. More general principles of user-centered design, such as those advocated by Jakob Nielsen in his *Alertbox* blog (ongoing) and his book *Designing Web Usability* (Nielsen, 2000), enhance this user-centric view of material and facilitates learning. The emerging learning experience design concept (Schmidt et al., 2020; Floors, 2023) adapts usability and user-experience design principles and practices to the design of instructional content. Note, however, that most of the materials just named are informational, not instructional.

Developing Templates to Publish Content

Templates are like fill-in-the-blank forms that prompt people when writing and producing content, and as such they serve as informal learning tools. Many instructional designers use these to create online tutorials, but primarily use them to ensure that the look and layout of screens is consistent across materials.

In addition to indicating where to include information, templates can also prompt users to provide particular types of material in particular places and guide people in writing this material. As a result, even when subject matter experts and users prepare content, it has a level of consistency with material developed by other subject matter experts and users, and incorporates many of the findability and usability principles that an instructional designer would follow.

Keeping Content Up to Date

If the material from which people learn informally is out of date, the learning, too, is out of date. Because instructional designers create or curate much of that material, we have responsibility for ensuring its ongoing accuracy. The problem is, although many instructional designers have great enthusiasm for developing new content like documentation, knowledge bases, tips and tricks articles, tutorials, and other similar types of resources used for informal learning, they have considerably less enthusiasm for keeping that content up to date.

To facilitate the ongoing maintenance of materials, organizations can include a publication date on all material it publishes. If the publication date seems like it's a bit dated, people might initiate a search for more recent material on the same subject.

To get a better handle on the maintenance of content, however, organizations might use content management systems, which are software used throughout an organization to store and organize content in files, distinguish among different versions of the same file, and track the process of developing content – from inception through approvals to publication. One particular capability of some content management systems is identifying an expiration date. When content “expires,” the person responsible for it receives a notification. That person reviews the material to determine if it remains current or requires updating.

Continually Promoting the Availability of Resources for Informal Learning

People cannot take advantage of informal learning opportunities if they do not know they exist, especially those opportunities that involve a conscious learning effort. So organizations need to constantly promote the informal learning resources and opportunities available to workers. Because instructional designers create and curate many of these materials, we are in a particularly strong position to also create the materials that will be used to promote them.

At the least, instructional designers should prepare catalogs that identify the key categories of resources and list and describe each learning resource

available and its intended or possible uses and audiences. Typically, organizations publish this material online through a learning portal or similar website.

At the most, instructional designers might prepare promotional materials, which provide short-term visibility to one or more informal learning resources or opportunities. Typical examples of promotional materials include:

- Announcement of a new resource, such as a subscription to a database like EBSCO or the availability of an updated standard operating procedure.
- Promotion of an individual set of resources to raise awareness of it, such as promotion of a series of tutorials on a new product line or a new program available through Coursera.
- General awareness of learning in the workplace, such as organizational events scheduled in conjunction with Learn@Work week sponsored by the Canadian-based Institute for Performance and Learning.
- Newsletter or webzine, a regularly published promotional vehicle that condenses several announcements into a single publication. In addition to promoting specific resources, these newsletters and webzines often include materials about how to make more effective use of informal learning in their newsletters and webzines.
- Social media posts, which call attention to many of the promotional efforts just described.

The preliminary results of my research on the informal learning practices of learning professionals suggest that informal learning opportunities receive far less promotion than formal ones.

CONCLUSIONS

This chapter introduced you to informal learning, described the many forms it takes, explained how it happens – both in terms of the larger context of the job and the actual learning process that occurs – and suggested a number of ways to facilitate informal learning. As an instructional designer, note that informal learning supports the transfer of formal learning to the job. The coaching, documentation, trial-and-error, and similar forms help workers apply skills learned in formal programs as well as generate new insights about those skills and their value. As a professional, also note that informal learning is a tool you can use yourself to strengthen your skills as an instructional designer and develop your career in this field.

Summary of Key Principles

1. The definition of informal learning varies depending on the context. *True* informal learning is a process in which learners set their own learning objectives and determine for themselves what successful completion looks like.

Because workplaces often prefer that people follow particular protocols and use accepted definitions of concepts, learners lose a bit of control over the learning process. As a result, the definition of informal learning in the

workplace is a process in which learners have some control over the process, location, purpose, and content of learning, and may or may not be aware that learning has occurred. Both of these definitions contrast with formal learning, in which an instructor or instructional designer establishes the objectives and a means to determine the criteria for successful completion.

2. Although informal learning has been around as long as humans have, interest in this form of learning has grown extensively in the past 20 years, some of it fostered by the adoption of the performance paradigm in workplaces, interest in related topics such as transfer of training and performance support, the rise of popular interest in the 70–20–10 model (though it is not validated by empirical research), and the rise of the Internet.
3. Informal learning can take a variety of forms, including ones that are primarily individually focused, such as experiences (like developmental assignments) and independent learning opportunities (like performance support), as well as ones that involve interactions with other people, including formal events (like symposia) and less-formal interactions with people, such as conversations in the workplace. Instructional designers often prepare some or all of these materials within organizations.
4. The act of informal learning is often triggered by a conscious or unconscious need for learning; the nature of the material learned often varies depending on the phase in which someone is in the cycle of their job, from orienting workers to the technical aspects of their jobs to workers actively preparing for their next jobs.
5. Effective informal learning also requires leadership to model it and give people permission to learn, recognizing that it differs from information sharing, a social activity, and that it is not always effective or efficient.
6. Technology facilitates informal learning, from the devices that permit it to occur wherever learning is most convenient for learners to the media that technology makes accessible and viewable for learners.
7. To facilitate informal learning, all learning professionals have responsibilities to gain executive support for it, subscribe to external content to expand learning opportunities, support people in their informal learning efforts, and recognize informal learning.
8. Also to facilitate informal learning, instructional designers, in particular, have a responsibility to help build an infrastructure of content that others can leverage for informal learning, designing those materials for “findability” and “usability,” developing templates for people other than instructional designers to publish content, maintaining content, and continually promoting informal learning content.

Application Questions

1. Before considering how you might incorporate informal learning into your instructional designs, first consider how

you might incorporate it into your own career. You recently completed your third year as an instructional designer with a training and development group within a medium-sized organization. During the past year, you worked alongside one of the more experienced instructional designers on a project that the more experienced designer planned. You took the lead on e-learning production but also helped with the design of some job aids and concepts guides that supplemented one large program, the development of two modules of another e-learning program, and the design and development of one of five related webinars. Although your manager asked if you might incorporate artificial intelligence (AI) into the program, the other instructional designer ultimately recommended against that because they did not feel sufficiently familiar with AI or its potential on this project: that was despite your offering specific suggestions. You performed satisfactorily and your colleagues feel that you are most effective on production assignments, where your knowledge of the most current authoring tools makes you a stand-out in your organization. But you enjoyed the design and development work the most. Some of your colleagues thought your design and development work was outstanding, while others felt your design work was merely adequate, noting that the lessons primarily focused on lower-order skills, provided limited guidance in application, and tended to rely exclusively on rote multiple-choice

questions for activities and interaction. As you think about the next year – and your career beyond that – consider these issues:

- What learning goals do you establish for yourself? Why?
 - How will you go about achieving these goals?
 - How will you recognize that you have achieved them?
 - From whom will you seek assistance? What type of assistance will you seek from them?
2. Now, consider how you might apply informal learning in your work. You are an instructional designer for the service center of a government employment agency. The center provides these services to the general public: applications for unemployment assistance, assistance with seeking a job (placement), assistance in determining which types of jobs are best suited to an individual (career counseling), and assistance with finding training and education to prepare one for a job, including guidance in locating financial assistance to pay for the training and education. Because of newly announced funding to address a spike in unemployment in your community, several workers from other centers will be transferred to yours to assist with the spike in traffic that the new legislation is expected to generate. Although all centers follow the same general approach, each has unique operating guidelines and addresses a slightly different clientele, as the economy in each community differs. Because the newly transferred workers will need to begin working with clients as soon

as they start work in your center, they will not have time for much training, yet they need to learn how your procedures differ from those in other centers and learn about the unique economic issues in your community. As you think about integrating these new workers into your center, consider these questions:

- How can informal learning help address the needs of these recently transferred workers? In terms of the opportunities to learn in the life cycle of a job, which phases does this type of learning address?
- What type of informal learning opportunities might you provide? Why did you choose these?
- Which characteristics of the informal learning process will you need to pay attention to when you design and curate informal learning for the recently transferred workers? Why? How will you address them?

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Problems, Potential, and Promise of Open Badges Creating a Design Strategy

Chris Gamrat and Richard E. West

In 2013, the American Institutes for Research described the potential of an emerging technology – digital open badges (Finkelstein et al., 2013). Since then, open badges have been the focus of research, the innovation in many start-ups and small businesses, and a transformative experience for many educators and learners.

In a little over a decade, open badges have grown in popularity. They are now a regular conversation in circles of primary and secondary education, higher education, informal education, and professional development. From a survey conducted in mid-2022, 1EdTech and Credential Engine surveyed 53 digital badge technology providers. They found that “there are 521,070 total badges worldwide that individuals can earn, 430,272 of which are available from issuers in the U.S. To date, there have been 74,780,775 badges already issued” (1EdTech, 2022). Not surprisingly, EDUCAUSE, a leading IT in higher education professional groups, published in their annual *Horizon Report* that microcredentials are anticipated to be a key technology to create new opportunities (Pelletier et al., 2023). With the popularity increasing, it is important to understand these open badge/microcredential technologies and how they can be used.

DEFINING OUR TERMS

While many treat the terms “digital badges,” “open badges,” and “microcredentials” as synonyms, there are differences. Microcredentials represent a small, specific achievement, something similar to certification, whereas digital and open badges, generically, are the “online representations of learning experiences and activities that tell a story about the learner’s education and skills” (Gamrat et al., 2014, p. 1136); if they use an open standard for representing the data (e.g., the verifiable credential or open badges standard), then they can be intentionally

organized to support lifelong learning (Gamrat & Zimmerman, 2021, p. 2616). By being *open* badges, rather than just *digital* badges, these credentials have the added benefit of a defined standard for openly sharing the data in the credential so that the badges can be transferred easily between systems and shared by the learner in various ways. In other words, an open badge earned in one institution (e.g., university) can be taken by the learner to a different institution (e.g., workplace learning) and maintained by the learner – and thus shared by the learner whenever they desire. While the terms *microcredentials* and *open badges* often signal the intended use, both use the same basic technological standards. Thus, for simplicity, we will refer to both badges and microcredentials in this chapter as open badges, and we will discuss later why many individuals and organizations differ in how and what to call these credentials.

HISTORICAL CONTEXT

In 2012, open badges were created by Mozilla to recognize their open-source software contributors. These badges were a form of recognition unique at that time because they included associated metadata that described details associated with the badge. To collect badges, Mozilla released the Digital Badge Backpack, a storage mechanism that offered an initial set of standards for what information might be part of a badge.

Significant early development of badges exploded when grants were awarded through the Badges for Lifelong Learning Competition in 2011–2013 (1EdTech, n.d.). This series of funded projects offered many researchers and practitioners the opportunity to better understand how different badging systems worked or did not work and offered many design principles to be considered (Hickey & Willis, 2017).

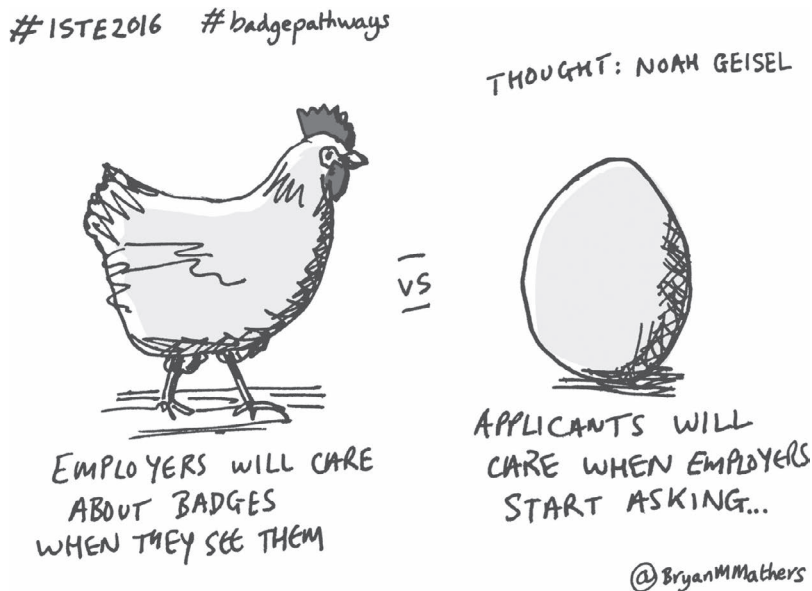
Notably, in the history of open badges, the Badge Alliance formed in 2014 as a series of special interest groups. Each group focused on different aspects of the emerging badge ecosystem, ranging from technical standards to use case stories to research on badging. Then, in 2017, Mozilla announced that it would no longer maintain the open badge standard. This change led to the transition of the development of the Open Badges technical standard to the stewardship of 1EdTech (formerly IMS Global).

Recently, other communities have emerged to develop open badging practices, such as the Open Recognition Alliance (www.openrecognition.org) promoting the idea of open recognition using open badges and verifiable credentials, a similar technology that emerged separately to accomplish similar goals. In June 2023, the implementation guide for Open Badges 3.0 was released, which offers unification between the open badges and verifiable credentials technical standards (www.imsglobal.org/spec/ob/v3p0/impl). Because the open technology standard was openly developed and shared, many vendors have sprung up to provide “backpacks” or “wallets” for containing the badges students earn. Some examples as of the writing of this chapter are Canvas Badges (Badgr), Credly (and Acclaim), Open Badge Factory, Bestr, Badgelist, Participate, and others.

PROBLEMS WITH OPEN BADGES

To better understand the adoption of open badges, we can use the Gartner Hype Cycle (Dedehayir & Steinert, 2016), which includes phases such as the

FIGURE 20.1 Illustration that badge demand is a “chicken or egg” problem (CC-BY/NDby Bryan Mathers)



Initial Development of the Technology, the Peak of Inflated Expectation, the Trough of Disillusionment, the Slope of Enlightenment, and the Plateau of Productivity. With open badges, we believe we are on our way out of the Trough of Disillusionment and into the Slope of Enlightenment.

It has taken over a decade to reach this point in the Hype Cycle. Why? We believe that in contrast to some other innovative ideas in education, which became very popular very quickly, open badges have taken longer to develop because badges require a three-part value proposition. They must be valuable to the learner, the employer, and the educational institution. Students do not want a credential that employers do not value. Education institutions do not want to provide a credential that students do not want. Employers do not want potential employees applying to jobs with credentials they do not understand. Because of this three-part requirement, badges require significant development to create perceived value for each group. Figure 20.1 illustrates the metaphor of identifying which will come first in this chicken or egg scenario. In this example, we may not know where the demand will come from first – employers or learners.

More rigorous research still needs to be done in various contexts, which we believe will lead to open badges arriving at the Plateau of Productivity in the Hype Cycle. However, to achieve this point, we believe that there are several key hurdles that open badges need to overcome.

First, there is a *lack of common definitions and terminology*. While the 1EdTech group made significant strides in developing the technical standard, we still need a shared understanding of badge terms and possible use among education professionals, learners, and employers. While there have been attempts (Braxton, 2023; Clements et al., 2020; McDaniel, 2016; Willis et al.,

2016), large-scale adoption remains evasive, with some studies calling these recognition mechanisms digital badges, open badges, microcredentials, nano-credentials, or other terms. Because of this lack of common terminology, there is a misunderstanding about using open badges within educational and social systems.

Second, *the body of research on open badges needs to grow*. A Google Scholar search of “digital badges” OR “digital badge” OR “microcredential” OR “micro credentials” OR “microcredential” OR “micro-credentials” on July 4, 2023, resulted in 4,860 results. In comparison, “MOOC” returned 281,000 results. The literature in this space is dramatically smaller, given a similar amount of time for exploration. This also leads to a reduced focus on theoretical frames.

A benefit of the work of 1EdTech and other early open badge developers can also be a deterrent for many who are curious to get started with open badges, that is, the technical detail and specifications involved in the standards can be confusing to non-programmers. Tech-savvy instructional designers may want to understand open badging standards and how the platform works to better design badging in learning experiences. However, we advocate separating the technology and the standard. Open badges are still relatively new, with new companies offering education technology solutions. To better understand how open badges work, a good place to start might be by exploring and understanding the associated metadata that is required for an open badge and remain platform agnostic, as badge systems may still come and go.

Third, *open badges can only be successful if supported by systemic change*. Gamrat and Bixler (2019) outlined several possible roadblocks preventing the successful implementation of open badges, and they found that one major roadblock is that adoption with any real value proposition (desirable for learners and employers) requires systemic change, including buy-in at all levels of the institution. For many instructors and instructional designers, there must be a clear path to achieving this level of buy-in at their institution. Badges with institutional support can be successful, as they benefit from the resources of time and attention. Likely, with administrative support, there will be resources to create a high-quality curriculum associated with the badges that can be vetted and supported.

In contrast, many creative, innovative, and nimble efforts can be implemented by the individual issuing open badges. Further, this presents a question to the learner and employers: how much value is there with a badge offered by an individual, department, or other organization? Because of the metadata within the open badge, it is possible, more than ever, to evaluate the learning experience to determine just how useful it is.

Fourth, *implementing open badges requires significant planning and effort*. Since open badges are still in the early phases of the Hype Cycle, there is still a significant likelihood of working in an uncertain environment. That is, open badges are still in large part being explored in different contexts, and while design considerations exist in research, there is still a significant chance for failure. The achievement of a successful open badge project can come from persistent effort through pilot projects, research, or observation and an exploration of others’ work in the space (published articles, presentations, and public documentation of the project). We still believe that the open badges concept is far from the Plateau of Productivity on the Hype Cycle and if you decide to engage in learning design practices in this space, you would still be considered a trailblazer or early adopter.

Fifth, *open badge implementations are difficult to sustain*. Hickey and Willis (2017) evaluated 30 McArthur Foundation grants for creating badging systems, and they found that from the start in 2013 to 2015 (the last year of data collection) these programs were running in various states: 11 thriving, 8 existing, and 11 suspended. While many design lessons were learned from these initiatives, Hickey and Willis also found important distinctions in open badge research. Research differentiates between research on open badges, where the focus is on the badge and research with open badges, where another aspects of research is being explored that is supported through the use of open badges in some way.

This offers a way of distinguishing the varieties of approaches documented within this evaluation (2017, p. v) and the rest of the body of literature in this area of research. When considering the sustainability and success of a possible open badging program, the context for what the open badges are for and how they are used likely matters a great deal.

Finally, *institutional hurdles often exist to overcome for true widespread adoption* of open badges. Among many potential issues is that students might find it challenging to get student loans to work on an open badge rather than a traditional certificate or degree, enrolled at least half-time, and many open badges are not tied to credit hours or courses that would translate to supporting a claim of a half- or full-time status. According to the U.S. Department of Education (n.d.), eligibility for loans is tied to pursuing a degree or certificate. Further, universities may not have registration and tracking systems for microlearning with open badges. Mechanisms for assigning faculty teaching “load” would be different, as would expectations for how a student could be “full-time” as they earn open badges, leading to issues related to their student privileges on campus or their visa status if they are international students.

Given these problems, why should instructional designers care? Why do we still believe open badges are a disruptive technology and an idea able to revolutionize teaching and learning?

POTENTIAL OF OPEN BADGES

Despite the initial challenges accompanying open badge systems, their usage continues to grow. We believe this is because of the unique potential of open badges to disrupt education and positively affect *learners, teachers, and institutions*.

Effect on Learners

How people learn is changing rapidly. Open badging technology affords an opportunity to create 21st-century credentials to match 21st-century learning. However, what is the effect on learners? Much of the research on open badging to this point has centered around how it might affect learner motivation. Many studies have found that implementing open badges has had positive effects on learner motivation. For example, Ashcroft et al. (2021) found that while students lacked awareness of open badges (a common finding), participants felt that open badges signaled value to students and employers – especially when representing both knowledge and competency. This motivated students to work harder.

Ashcroft et al.'s (2021) study was just one example. Ahsan et al. (2023) synthesized 56 articles published on open badges and found motivation to be a common theme across many of the studies. But it's not always clear-cut (see West & Cheng, 2022). Abramovich et al. (2013), for example, found that while lower-performing students were motivated by badges that were offered for simply completing a task or course, higher-performing students were more motivated by badges that represented mastery of a skill rather than just completing a task. The point for us as instructional designers is that implementing open badges is not a quick solution to improve motivation.

The success depends on the type of learner involved, as well as other factors. One of these other factors is what employers in the area think about open badges. Van de Laar et al. (2022) studied African Ph.D. fellows completing a massive open online course (MOOC) and found that they were less motivated by open badges than traditional paper-based certificates that were more recognizable by employers. In another study, Peacock et al. (2020) found that implementing microcredentials was not as motivating as other pedagogical issues. This reinforces wisdom in our field that while technology can certainly spark positive impacts in learning, ultimately, pedagogical strategy and other factors play the most central role. The same is certainly true with open badging.

Badges may have impacts on learners beyond affecting motivation, however. One of the greatest potential benefits of open badges is the ability to recognize all of a student's learning and attributes. Traditionally, recognition of learning has been unnecessarily limited and constrained. For example, learning only "counts" if you acquire it at one place (e.g., the university), at one time (e.g., the day class begins and the learning management system lets you in), and in one way (e.g., "no, we're not at that unit yet, you need to wait"). Unfortunately, modern life makes these constraints problematic for many learners, especially when the reality is that we are learning all the time, everywhere, in lots of different ways, and in relationships with many peers and mentors.

Open badges have the potential to recognize all of this learning, both in formal situations (e.g., school) as well as informal ones (e.g., work experiences, play experiences, community experiences). Because of this movement toward open and comprehensive recognition of all one's learning, accomplishments, and attributes, technologies are being developed to provide this comprehensive recognition, and open badges/badges could be part of this ecosystem. To learn more about open recognition, we recommend visiting the Open Recognition Alliance (www.openrecognition.org) and the Open Recognition for Everybody community, sponsored by Participate (<https://app.participate.com>).

Because open badges can recognize both formal and informal (or even non-formal) learning, they are an excellent technology for supporting lifelong learning. Zhao and Watterson (2021) argued that the COVID-19 pandemic taught us that education must be different to meet modern needs:

While helping students develop basic practical skills is still needed, education should also be about development of humanity in citizens of local, national, and global societies. Education must be seen as a pathway to attaining lifelong learning, satisfaction, happiness, wellbeing, opportunity and contribution to humanity.

(p. 5)

Zhao and Watterson then argued that this new approach to education needed to (a) teach modern, 21st-century competencies; (b) enable personalization of learning for students; and (c) allow for educational curriculum and systems to change and evolve as the world does. Traditional educational systems struggle to be flexible enough to meet these three needs. However, a more microlearning curriculum, supported with badges, can allow for the flexible blending of formal/informal learning, learning at work, and learning at school, with personalization for each learner based on what they need to learn, where, and when.

Effect on Teachers

In addition to potentially providing great benefits for learners, open badging has great promise to positively affect teachers too. There is substantial research on teachers using badges for their professional learning, but we also believe open badges can help them in their role as teachers who implement the badges in their courses. The main benefit is that it can facilitate pedagogical changes. Because badges, by definition, represent smaller chunks of learning, they are more easily modifiable and configurable to allow for different learning strategies. So this affords greater flexibility in teaching. If a teacher wants to change up their class, they can do it one micro piece of learning at a time. Or, as we have done ourselves, offer increasingly more options to students by just adding one new open badge (plus content) each year. Once you have a collection of badges to offer, you can remix the list of options each semester based on what your goals are for the class.

For example, the state of Utah now offers professional development for teachers (with credit for relicensure and promotion) that is based on microcredentials (see www.uen.org/utahmicrocredentials). In this system, any school district, local educational agency (LEA), university, or other institution of higher learning can create its own microcredentials for teachers. The state department of education reviews each proposed credential but grants considerable flexibility to the LEA in how they design the microcredential as long as they require evidence that meets state expectations. To solve the problem of staffing reviewers for each microcredential, teachers who have previously earned a credential can then be paid by other applicants to review the badges, creating a sustaining system.

The second reason why using open badges benefits teachers is that the process of creating open badges requires teachers to consider core questions of their assessment strategy, such as: What knowledge, skills, and attributes (KSAs) do I really care about? What evidence would I accept that someone has these KSAs? Who do I feel would know best if someone deserved to earn this recognition? Also, some open badging implementations focus on engaged participation in a community rather than formal KSAs. However, similar questions would be asked, such as: What does engaged participation look like in this community? How will we know when we've seen it? Who is most qualified to recognize this participation, me or peers (or others)? Asking these questions can help instructors to drill down on what they most want for learners and what their role as teachers can be to assist them in achieving it.

Similarly, when open badges are used to disrupt our educational routines and cause us to think differently, we may be able to consider innovative

new pedagogies. For example, West et al. (2020) have shared ways that open badges could support inquiry-based and open-ended learning – instructional approaches that are often challenging to implement. They argued that badges are uniquely structured to assist inquiry-based learning by (a) helping students gain prerequisite knowledge/skills necessary for engaging in inquiry; (b) supporting the flexible assessment models needed for open-ended learning, such as inquiry-based approaches; (c) offering multiple choices to learners about paths they can choose in their inquiries; and (d) allowing learners to claim KSAs as they are developed, enabling more student-focused, bottom-up learning and assessment.

Effect on Institutions

Similarly to individual instructors, implementing badges can help educational institutions to evolve their systems and pedagogies. There are frequent calls for reform in higher education, but it is hard to know how to make these changes effectively. Open badges can catalyze change by being different enough to reorient instructors, departments, and whole universities toward a focus on skills, authentic assessment, personalized learning, learner agency/choice, and flexible learning.

Particularly, scholars have critiqued educational systems for having too strong a focus on learning content, arguing that:

More important, perhaps, is the realization by educators, parents, employers, and students themselves that they desire and need more from education than just knowledge – they want education to promote the development of students’ identities: self-knowledge, values, goals, and orientation and skills for personal and social transformation that would help in coping with the rapid changes that characterize life in this century.

(Kaplan & Flum, 2012, p. 171)

As educational institutions strive to focus more on developing the whole student and their identities/values/ways of learning, it is clear that we need flexible methods for recognizing all the learning and growth that students have. Relying solely on grades and degrees earned within a 16-week class assumes that students’ identities and self-concepts are not growing at other times and places in their lives. By embracing more open recognition, educational institutions can focus on developing people rather than providing educational content and could partner with other organizations to assist in this endeavor.

In addition to the benefits of evolving institutional pedagogies, implementing open badges can provide other positive effects. For example, because open badges can be easily transported across institutions, universities could streamline their workloads by collaborating with other partners who can provide some of the education to learners (e.g., employers providing workplace education and community-based education). By streamlining the collection of learner data in the moment of learning and packaging it with instructor comments, badges can serve much of the purpose of lengthy letters of recommendation. No more trying to remember who a student was or how well they did in your course, years later when they ask for a letter of recommendation!

Finally, open badges can help meet the need to balance institutional control over credentials with faculty bottom-up innovation, as badges can serve as a semiformal credential that does not need as much oversight as formal degrees and certificates. By being more flexible and semiformal, this can enable faculty to innovate more nimbly and make changes to support learners working in rapidly changing economies. For example, if a learner needs a skill for their career, and the university does not yet provide a course on it, perhaps the learner could gain the skill somewhere else, with an open badge serving as a transferrable credential. Finally, research has found that there can be great marketing and retention benefits from implementing badges within an institution (e.g., Young et al., 2019). This is because, in part, open badges are easy to share, and every time they are shared, it is advertising for the home institution.

The Promise of Open Badges

So, what is the reality of implementing open badges? Will the future of this digital innovation be more like the problems experienced or the enticing potential driving their use? The truth will likely be somewhere in the middle. While the current technologies may be replaced, we believe open badges represent some sticky ideas for learning and instructional design that will not go away. Thus, the following are some ideas that we believe represent the *promise* of what we can expect with open badges in the future.

INTEGRATION OF FORMAL/INFORMAL LEARNING When access to information and mentors was limited, education was necessarily formalized, and public education became a cornerstone of our communities (Long, 2020). However, since the internet has democratized access to information – and with communication technologies also increased access to mentors – it is no longer necessary for formal educational institutions to carry the entire load for educating members of society. Instead, quite naturally, people learn in many locations, including at work, at home, with neighbors, in affinity groups, online, and in families.

However, despite “anywhere, anytime” learning opportunities, our systems for recognizing and credentialing that learning have lagged. Increasingly, learners will demand to have their learning acknowledged. And while we acknowledge that “anywhere, anytime” learning is often less reflective than degrees and in-depth learning experiences, there will be increasing pressure to create systems that integrate formal and informal learning more seamlessly. This will further be supported by the push for lifelong learning, which McGarrah (2015) has called the foundation for learning and working. These pressures to recognize all of our learning throughout our lives, we believe, will create a need for open credentials.

MORE FOCUS ON MICROLEARNING As society becomes more fast-paced, many careers require rapid retooling and relearning. A proposed solution to this need for continual, highly targeted education is microlearning, or learning of specific content tied to narrow objectives – often in 15-minute segments of time or less. This need for microlearning is burgeoning, as evidenced by the increasing amount of scholarship on the topic and the increasing use of these credentials, with nearly 75 million having been issued, according to

1EdTech (2023), a 73% increase from 2020. Leong et al. (2020) reviewed 13 years of research on the topic, identifying 476 relevant publications, which they found to be increasing more recently. In their review, they identified several benefits of microlearning: (a) better conceptual retention, (b) better learner engagement, (c) improved learner motivation, and (d) improved learning.

MORE DEMAND FOR DATA-BASED ASSESSMENTS/CREDENTIALS In the past, we have accepted that we can trust credentials without specific evidence. If a student earns a grade in a course, particularly at an accredited institution, we do not ask to see their work or the assessment from the instructor, or the criteria the instructor used for the assessment. Through history, we have learned to rely heavily on the grade on an official transcript and accept that the student has demonstrated mastery of the material, grit, perseverance, and the course objectives – though we don’t know what those might be. We base the judgment on the title of the course and the reputation of the institution. However, increased precision in understanding what the variety of achievements mean is becoming increasingly important, as the specific tasks associated with positions are a focus for education and learning, particularly in professional development.

Increased transparency about what a person learned, when, and how they were assessed (and against what criteria) is an important cornerstone to the usefulness of various kinds of credentials. Digital open badges can provide a potential solution to this search for transparency by packaging learner and assessment data in accessible ways. Indeed, Reed (2023) argued that evidence of the learning is an essential, core aspect of badges and its key feature for inclusive, individualized learning.

Also, as learning and data analytics grow in popularity, the thirst for more learner data will also grow. As this data is collected about learners, it is natural that learners will want to control that data as part of their learning credentials and records. Flexible, open technologies can enable this, whether open badges or comprehensive learner records (see www.imsglobal.org/activity/comprehensive-learner-record), a similar but competing open standard for packaging all learning into one record.

CONCLUSION

Open badges have a great capacity to disrupt learning and increase access. From its inception in the early 2010s, to now, there is a demonstrated increase in interest in capturing and recognizing learners’ experiences in increasingly accessible and transparent ways. We have argued that the trajectory of the open badge concept follows the Gartner Hype Cycle, and using that mode, we might be able to learn from prior work and the history of open badges to determine where they will ultimately land as a normalized tool. There have been many challenges and successes in developing open badges and supporting systems, but the promise of benefits from open badges for students, instructors, and institutions presents many opportunities. Whether open badge implementations are successful depends on how skillfully the learning experiences, feedback and assessment, and community relationships are designed to support earning the badges as well as the systemic change nature

of the implementation. Indeed, like any educational technology, the potential of open badges can be best optimized by applying sound instructional design practices and theory.

Summary of Key Principles

1. Open badges, microcredentials, verifiable credentials, comprehensive learner records, and similar technologies provide new opportunities for supporting informal, semi-formal, formal, and mixed-formality learning.
2. Designing open badges is hard due to the level of transparency inherent in the design. Anyone can see what it took to earn a badge, which therefore opens the badge to scrutiny.
3. Open badges are still in the early stages of the Gartner Hype Cycle. Thus, they have experienced expected challenges but still offer exciting potential.
4. Open badges are an intellectual currency and, as such, require time to develop perceived value on the part of the learner, employer, and educational institution.
5. Open badges not only provide potential for a positive impact on learners but also have the potential to provide benefits to institutions, teachers, employers, and other members of society.
6. Whether open badge implementations are successful depends on how skillfully the learning experiences, feedback and assessment, and community supports are designed to support earning the badges.

Application Questions

1. If you were working as an administrator for a university with concerns on how to be efficient with course design resources, how could you balance using open badges to provide learners with more choices while also not competing with traditional courses that are essential to your bottom line?
2. Imagine you are an instructional designer for your university, and you are asked by student services to develop a program to help students learn wellness in emotional, financial, mental, and physical resiliency. How could you use open badges to design this campus program? What would be the challenges you might expect to face? How could you design the badging system to overcome or at least anticipate these challenges?
3. One of the challenges with open badge implementations is that it can take a lot of staff time and energy to manage/review/award the badges. How would you approach the potential scaling problems that come with open badges? What might be both micro- and macro-level concerns for your department/institution?
4. You're an instructor for a general education course that has a lot of content to cover, but you want to incorporate more problem-based teaching strategies. Could you use open badges to help students learn the content in preparation and support problem-based learning? How

well do you think this would work?
Why or why not?

5. Employers are requiring an increasingly nimble workforce. For example, imagine you are an instructional designer working in the corporate world, seeking to develop just-in-time employee training for an organization. How

could you leverage open badges to prepare learners to progressively upskill in their job and improve their performance? What would be the benefits and challenges to the employer? To the employee? How could you leverage open badges to promote lifelong learning and career development?

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SECTION VI

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What ID Professionals Do in Various Settings



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Instructional Design in Business and Industry

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A primary arena for the practice of instructional design (ID) is within the private sector – primarily in business, industrial, health care, government, and military environments – that is likely the result of the ongoing need for employee training¹ as an integral part of most organizations. In the United States alone, in 2022, corporate training expenditures passed the 100-billion-dollar mark for the first time (Statista, 2022). Training expenditure considers a company’s allocated budget for training activities, spending on training-related technology, and salaries paid to internal training staff (Statista, 2022). The investment in education and training in business and industry is not unique to the United States but is duplicated to a great extent worldwide. While business and industry continue to expand globally, so does the demand for employee training.

From 2021 to 2022, U.S. training expenditures increased by 10 billion dollars (Statista, 2022). The growth reflects an emphasis not simply on producing a more knowledgeable workforce but increasingly on improving employee on-the-job performance and on implementing interventions directed toward organizational problems and opportunities. ID today encompasses much more than simply producing instruction. It is now associated with an overall design approach that focuses on the audience and the client relationship, designing interventions around situations of inequity, lack of diversity, and non-inclusion, and designing to bring sustainability in activities each day.

In this chapter we will expand on the nature of ID practice in the business and industry environment. We will discuss:

- The role of instructional designers and others on design teams
- Designing with a client group for an audience of focus

1 We are not distinguishing here between the concepts of “education” and “training.” Consequently, under the umbrella of the term “training” we are including all types of professional development and performance improvement activities, from technical training to executive development.

- Trends and issues in corporate instructional design and development, including:
 - Nurturing a designer–client relationship
 - Designing interventions around situations of inequity, lack of diversity, and/or non-inclusion
 - Designing with ethics for sustainability

THE ROLE OF INSTRUCTIONAL DESIGNERS AND OTHERS ON DESIGN TEAMS

There are numerous approaches to ID in the corporate sector. In this section, we will examine these approaches and some of the factors that can impact the design process.

Roles of Instructional Designers

Traditionally, instructional designers take on one of three roles in a corporate setting; sole designer, team member, or external consultant. These roles vary by organization and by project. We begin this section with the examination of each of the three roles that instructional designers may play. Later, we introduce others who influence design in business and industry.

SOLE DESIGNER Designers are change agents with the goal of affecting knowledge, skill, and/or the performance of the learner, team, and/or organization (Tracey & Boling, 2013). In the past, it may have only been in some smaller companies and on small-scale projects that an instructional designer might serve as the only *permanent* team member. However, the instructional designer of today may find themselves in various organizational cultures as the sole designer on a project. In this case, a subject-matter expert, working temporarily on the “team,” typically provides the designer with the necessary content to develop the instructional materials and is involved only as needed (i.e., subject matter review and revisions). Other employees in the company, such as media developers, scriptwriters, graphic designers, and computer programmers, may be responsible to produce all materials, while a facilitator or human resource manager may be responsible for scheduling, marketing, implementing, and evaluating the completed instructional intervention or product. Although others will contribute to the design, the instructional designer may maintain overall control and responsibility empowering a project or account manager to maintain the day-to-day operations. Finally, the subject-matter expert may also be the instructor, in which case they may take a greater interest and responsibility in the design and implementation of the intervention.

TEAM MEMBER/LEADER As ID has evolved in business and industry, a team including numerous members may be responsible for the design of an instructional product. The number of instructional designers on a team can vary from one to several, and the responsibility level can vary from that of the senior or lead designer to the instructional designer or technologist. For example, we were design consultants on a project to redesign a nine-week pre-service institute (PSI) to prepare new child welfare workers for their roles as children’s protective services, foster care, and adoption specialists. In the yearlong PSI design project, we led 46 designers grouped in 10 design teams and consulted

with training directors, training managers, child welfare department managers, and subject-matter experts. Team members will vary depending on the learners, the type of technology used for delivery, and the scope of the project. Table 21.1 provides a list of possible team members.

Teams themselves vary depending on the type of organization and the complexity of the project. Three of the more common types of work teams are virtual teams, cross-functional teams, and contractor-led teams.

With increased globalization and decentralization of organizations, instructional designers participating in or leading project teams in organizations are more likely to find themselves part of a virtual team, rather than a team located at the same physical site. For our PSI design project, we were not located in the U.S. state where the child welfare specialists worked. Many of the 46 designers who worked on the project were in U.S. states other than where the specialists would do their work and where we were as the design consultants. In some cases, the team members may be in the same general geographical area but unable to physically meet. More common, however, are virtual teams with members in different time zones within one country, or in different countries around the globe. Virtual design teams must use forms of electronic communication for needs assessments, design reviews, and meetings. With the creation of communication tools, including Skype, I-Chat, Google Docs, Zoom, Microsoft Teams, and Adobe Connect, virtual team communication is inexpensive and efficient. One challenge of today's virtual team is working together across numerous time zones and on similar workdays for the various locations, as instructional designers now find themselves working in extremely diverse cultures across the globe. Another challenge of not being co-located can center around the joy of connectedness. Ideas can emerge from personal human contact, which may get lost in the convenience of remote work.

TABLE 21.1 Instructional Design Team Members

Team Member	Assignment
Stakeholders	Duration of the project
Instructional designer(s)	Duration of the project or design phase
Subject-matter expert	Begins with initial design planning meetings and stays through implementation
Evaluator	Duration or starts prior to conducting formative evaluation
Project manager	Duration, often starts prior to design planning phase
Text editor	Begins during production
Multimedia/computer programmer	Begins after strategy design or at the start of production
Video/audio production	Begins at the production phase
Scriptwriter	After strategies are designed or at the production phase
Graphic artist	Begins with the production phase
Translator	Begins with the production phase
Audience of focus	Begins with design meetings and continues through formative evaluation

Collaboration is an important key to the success of a design team. Collaborative designers must possess behaviors that include expressing ideas, listening, and negotiating (Tracey, 2015). A design teams' process of designing is as important as the final product, so ID team members and leaders encouraging productive collaboration produce more innovative designs. Some maintain that we must look at design as an opportunity to collaborate *with* the stakeholders and the audience of focus, not *for* them (Brown, 2009). Collaborating with stakeholders and the audience of focus on a regular basis results in a product requiring fewer revisions during formative evaluations. If the design team can collaborate face to face, they may experience a nurturing of relationships and inspiration, allowing designers and team members to build on each other's ideas. The key to a successful design collaboration is ensuring that all members of the team agree and embrace one common goal (Tracey & Baaki, 2022). Without agreement on a common goal, the team may communicate; however, they most likely will not collaborate.

Design work in major companies is also outsourced to organizations or individuals offering design expertise. As a result, many instructional designers working particularly in large companies and in the military have experienced a shift in their role. Much of their time is now spent as project managers and supervising contractors with varying degrees of instructional design expertise. Coaching the external design team on the culture of the organization is a key role of the instructional designer in these situations.

EXTERNAL DESIGNER/CONSULTANT The client company hires the external instructional designer/consultant to produce a product or lead a project. The ID team can consist of all external members or can be made up of a combination of internal members, including developers, managers, and/or subject-matter experts, as well as the designer and additional external members. In the PSI design project, we and the 46 designers were external members to the child welfare department, and we closely collaborated with a variety of people within the child welfare department. Over the years to streamline services and become efficient, many organizations have reduced in-house training departments and increased the use of external consultants. Oftentimes, an external design consultant is hired for what the client may see as a *training* problem. The design consultant must then use excellent communication and observation skills without a robust and effective needs assessment process to identify the root problem and its causes. The design consultant must communicate and educate the client by recommending the best solution that may not align with the initial request, demonstrate potential return on investment for a different solution, and ensure that the client is aware of the trade-offs between the initial desired solution (e.g., mandated training) and the more promising solution that emerges from the needs assessment (e.g., a job aid, support plan, or other performance improvement measure). The skill set of the external design consultant must include the ability to build a relationship with the other players in the ID process, educate the client, as well as provide the best solution to the problem.

Roles of Other Players

CLIENT Numerous clients may be involved in a design project, including the corporate employee who hired the instructional designer, other stakeholders in

the company, the audience of focus, and members of the internal design team if the instructional designer is an external member. In the simplest environment the client *owns* the problem or opportunity usually because they are the supervisor or manager of the audience of focus. It is important for the external design consultant to identify all the clients immediately (Morrison et al., 2013). For example, there may be two or more clients. First is the individual who is funding the project, who may be called the *stakeholder* and second is the *owner* of the problem or opportunity who may be the manager of the audience of focus. An additional level of complication is added when one manager funds the project and another individual serves as project manager or *decision influencer* who may be the primary contact throughout the project and the conduit between the design team and the *decision maker*. Some projects are even more complicated when one considers external subject-matter experts, additional internal design team members, or others who can influence design reviews or decisions. While each ID project will have at least one client, the designer must identify the entire client group who can influence the process and agree on the best method of communication and collaboration. Identifying the various clients and their responsibilities and expectations will help the designer to solve and to prevent problems. It is the role of the instructional designer and the design team to educate the client group on the entire process and the purpose and value of each step in the design process.

SUBJECT-MATTER EXPERT Traditionally, identifying a subject-matter expert (SME) who provides the necessary content for the designer to design and develop the instructional intervention fell on the client. With increasingly complex problems designers are required to design solutions for, a broader pool of SMEs is needed. These may include someone who is expert on the content, another who is expert on the audience of focus, and another who understands the organizational culture and one who provides expertise on the delivery system. Instructional designers must collaborate with the stakeholder to identify and understand all the SMEs needed for the design product along with the amount of time each is able to commit to the design effort (Morrison et al., 2013). Once this requirement is determined, the designer must create a communication system that works with the SMEs. Each SME may have a different mode of sharing valuable information and the designer must be flexible, able to critically think and ask the right questions to garner the information needed for a successful design. Ideally, the SMEs are ongoing members of the design team. Throughout the PSI design project, we worked with child welfare specialist trainers, experienced specialists and child welfare supervisors, medical doctors, and legal experts. The designer along with the rest of the design team members will need to be flexible in their communication and design process to make sure this occurs.

AUDIENCE OF FOCUS The audience of focus is corporate employees, managers, and leaders who, with the goal of altering performance, use the designed product or intervention. Traditionally, instructional designers gathered audience information through surveys, interviews, or other data-gathering methods. Today, more design teams are urging representatives of the audience to be ongoing members of the design team. This approach is to help designers empathize with the audience by developing emotional connections and

understanding, which can serve as a bridge between designer and audience (Kouprie & Visser, 2009).

DESIGNING WITH A CLIENT GROUP FOR AN AUDIENCE

Instructional designers collaborate with other designers, a client group, and an audience and must ensure everyone has the same goal. A moment of use approach to design can drive a collaborative goal. An audience, designers, and the client act in context. A moment of use approach emphasizes specific moments where we scale back context to what is needed in a situation or moment (Baaki & Tracey, 2019; Baaki et al., 2023, 2022; Tracey & Baaki, 2022). One side of moment of use emphasizes a personal side of context (Meloncon, 2017) where a designer reflects on their context and the context of the client and the audience of focus (Baaki & Tracey, 2019; Baaki et al., 2023, 2022; Tracey & Baaki, 2022). The other side of moment of use stresses action where a designer designs with a client group for an audience of focus. When designing to a collaborative goal, a designer examines the context and interacts with the client group and audience to determine how they will use the intervention (Baaki et al., 2023; Herman et al., 2023).

Collaborating With a Client Group

A client group is a singular form used to represent all clients involved in one project (Siva & London, 2011). A client group may include more than one person who all interact with the designer through a designer–client relationship (Siva & London, 2011). At different points during the moment of use design process, one, some, or all people in the client group may interact with the designer. In the PSI design project, our client group was scalable as, we interacted, monthly, with an executive working group of 12–16 people and when needed, we interacted with two or three subject-matter experts. Twice during the project, we facilitated design workshops where 25–35 people from the client group assisted us in understanding how a child welfare specialist manages a children’s protective services, foster care, or adoption case.

Although a client group implies a well-defined group of people who act as a single entity (Tzortzopoulos et al., 2006), what is more accurate is that the client group often represents conflicting values, interests, and time perspectives (Bertelsen & Emmitt, 2005). In designing an online training course for an automaker’s dealership master technicians, dealership service managers wanted to ensure that the dealership maintained productive technicians, training project managers wanted to ensure that master technician courses were offered on a timely schedule, and district managers wanted to make certain that they reached their budget goals regarding the number of technicians promoted to master technicians. As a result, throughout the design and development of the online training course, a critical collaborative goal was not clear. In the moment when a master technician is servicing a vehicle, the technician is fully prepared to properly make the repair.

Designing for an Audience

The PSI design project’s audience was new child welfare specialists who are children’s protective services, foster care, or adoption specialists. The 10

design teams used a moment of use approach to designing their PSI design deliverables. Design teams met new specialists where the specialists were, not where designers thought specialists should be. The design deliverables provided specialists with what they would need in a child welfare case situation or moment, for example, specifics on what to observe when entering the home of a child they are serving. When designing design deliverables, designers provide learning activities specifically for the audience's context where the audience of focus has an opportunity to apply the activities (Baaki et al., 2023). In the redesigned PSI, specialists learned the children's protective services, foster care, or adoption case process, experienced the case process at their home agencies, and participated in activities that dove deep into what happens in case situations. For example, a foster care specialist learned that court was an important task in their case process. The foster care specialist experienced attending court to view a seasoned foster care specialist engaged in a court case. To prepare for their own court appearances, new foster care specialists participated in mock court cases.

Reflection alone is impotent, while action alone is blind (Csikszentmihalyi, 1990). One side of a moment of use stresses reflecting on the personal side of context. A designer's, the client group's, and the audience's personal side of context is dynamic, about interpretation, filling spaces, and meaning making to move forward (Baaki & Tracey, 2019). The designers in the PSI project reflected on their bias, child rearing, and how they were raised as a child when making design decisions for the case workers' moment of use. A moment of use approach is more than reflecting and being empathic for the client group, audience of focus, and the designer themselves. As designers of change, designers act by developing learning activities and experiences so the audience of focus may apply the activities and experiences in the moment needed where they perform.

TRENDS AND ISSUES IN CORPORATE DESIGN AND DEVELOPMENT

Instructional designers are rethinking how they work within and for corporations, government, military installations, and others in need of design expertise. Three examples of trends in business and industry include nurturing the designer–client relationship, designing interventions around situations of inequity, lack of diversity, and/or non-inclusion, and designing with ethics for sustainability.

Nurturing the Designer–Client Relationship

A moment of use approach to design emphasizes specific moments where instructional designers scale back context to what is needed in a situation. The audience of focus, the instructional designer, and the client group act in context. Client culture is an essential element of a client group's context. For example, we worked with the Lenape Nation of Pennsylvania (the client group) to design learning activities and experiences to revitalize the Lenape language. Our audience of focus was both Lenape and non-Lenape people. While collaborating with our client group, we quickly realized that Lenape

culture is different than western culture. We had to remove our western thinking hats and design *in* the Lenape culture, not just *for* the Lenape Nation. We nurtured a designer–client relationship so we could learn the Lenape Nation culture.

Designing Around Situations of Inequity, Lack of Diversity, and Non-Inclusion

Wilkerson (2020), in her best-selling book *Caste: The Origins of Our Discontents*, contends we have a responsibility to develop a radical kind of empathy for people who experience inequity or non-inclusion. A radical kind of empathy involves learning and listening with a humbled heart to the experiences and feelings of other people. We open ourselves to their perspective. Moving the needle to situations of inequity, a lack of diversity, and/or non-inclusion demands changes to everything we do every day. Tonkinwise (2013) refers to radical, sustainable design, which means “designing little things a lot, all over” (p. 14).

To design with diversity, equity, and inclusion, designers need to be introspective, interact with the client, and design with intention (Tracey & Baaki, 2023). Introspection begins with understanding the context surrounding what the audience of focus will do in their performance environment (Baaki et al., 2023). A designer educates themselves and connects and communicates with the audience of focus on a deep and personal level. Introspection does not need to be a solitary event. A designer may find it helpful to collaborate with a design team. This is particularly important when designing with diversity, equity, and inclusion. A collaborative structure can help a designer become aware of their inherent bias and recognize moments of use that may have gone unrecognized (Herman et al., 2023).

In addition to collaborative introspection with fellow designers and the client group, interacting with the audience of focus provides opportunities to reflect on how the audience of focus will use the design deliverable and the diverse ways the audience may act (Herman et al., 2023). A moment of use can be a brief moment or a longer moment which aligns well with Tonkinwise’s idea of design little things a lot, all over. For example, Herman et al. (2023) discussed an instructional designer’s interaction with students of color who were negatively impacted when attempting to access an exam proctoring platform. The short-term moment of use was the time it takes for a student to log on to a proctoring software platform. The long-term moment was the time it takes to get rid of policies that impede a college campus to diversify.

A designer designs with intention. In the previous example, a designer may intend to design for greater equity and inclusion, but a designer will never impact a more equitable and inclusive society if they fail to act (Herman et al., 2023). Designing to a moment of use means identifying the specific moment of use for a design and designing for that moment.

Designing With Ethics for Sustainability

Merriam-Webster (n.d.) defines ethics as dealing with what is good and bad with moral duty and obligation. Designing with ethics means an instructional

designer makes ethical choices and then acts. When making design decisions, an instructional designer must consider the results and implication of their decisions (Tracey & Baaki, 2023). Manzini (2006) suggests three guidelines for designing with ethics for sustainability: (a) promote well-being, (b) enable people to live as they like and in a sustainable way, and (c) enhance social innovation and steer toward more sustainable ways of living. Instructional designers can promote well-being by including the audience of focus. What the audience of focus brings to the design project is their potential using their skills, knowledge, and abilities to get results (Manzini, 2006).

Manzini contends that designers must move from designing to solve problems to designing to enable people to live as they like. For instructional designers, this means designing for a moment of use and designing to enable the audience of focus to perform. During the PSI design project, instructional designers focused on what a child welfare specialist needs when they conduct a home visit, when they perform a forensic interview, or when they appear in court.

An instructional designer's relationship with the audience of focus can enhance innovation, which can steer toward more sustainable ways of performing. While the audience of focus knows what they want to achieve, an instructional designer is an expert with specific design knowledge and design skills. A designer's design knowledge and skills help to find a balance between the macro-situation (how things have changed and are changing) and the micro-situation (the moment of use).

CONCLUSION

The most prevalent applications of instructional design now occur in corporate settings. These complexities and pressures of these work settings shape not only the roles of designers, but also in many cases the design processes themselves. Demands for globalized instruction that impact social issues are stimulating the evolution of ID. As such, designers nurture the designer-client relationship and involve the audience of focus to design complex interventions.

Summary of Key Principles

1. **One of the primary arenas for the practice of instructional design (ID) is within the private sector.** Since the 1980s there has been a steady growth of employee training in business, industrial, and military settings.
2. **There are three broad categories of roles that instructional designers may take in a corporate setting.** A designer may be a sole designer, a team member/leader of a design team, or an external designer/consultant.
3. **There are roles other players have in the design process that are critical to the success of the instructional intervention and product.** The client(s), subject-matter expert, and audience of focus are critical players in the design process. Instructional designers must work to communicate and collaborate with the client group.

4. **Collaboration is an important part of ID. The designer must identify and embrace their relationship with the client group and the audience.** Collaboration goes hand in hand with designing innovative instructional interventions. The designer nurtures the designer–client relationship and involves the audience in the design process.
5. **There are many changes in the training industry, including designing interventions around situations of inequity, lack of diversity, and/or non-inclusion and designing with ethics for sustainability.**

Instructional designers in response to these trends ought to embrace the role of practitioner, educator, and researcher to identify, document, and execute best practices. When designing instruction, the designer must identify the societal and learner cultural factors. Instructional designers today must also understand the infusion of a moment of use approach in all areas of business and industry and educate the client group on the alignment of moment of use activities and ID.

Application Questions

An international corporation was building the largest shopping mall in the world. To ensure that this mall would be the cleanest mall and deliver world-class service, the corporation hired a U.S. instructional design consultant to work with a U.S. external cleaning company. The consultant was charged with assembling and supervising a team to design, develop, and deliver customized instruction for the cleaning staff implementing the mall cleaning system. The customer wanted the instruction designed to ensure that workers identified and executed their job tasks efficiently and increased their productivity. The workforce to clean the mall comprised multinational recruits from four different countries (India, Bangladesh, Nepal, and the Philippines), none of whom spoke a similar language. Reading skills of the workers were minimal or

nonexistent, and none had prior experience in cleaning a mall. All were immigrants brought in by the parent company. The learners were 40 team leaders, identified from the initially hired workforce by the customer, and 375 cleaning staff members.

Answer these questions:

1. What is the role of the external instructional designer?
2. What are the roles of the “other” players?
3. What questions would you ask to assist you in determining the societal and learner cultural factors?
4. How would you design instruction for this cross-cultural workforce?

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Instructional Design Opportunities in Military Education and Training Environments

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The military forces of any nation, whether it be the United States Army, the British Royal Marines, the Royal Dutch Air Force, the German Bundeswehr, the Singapore Armed Forces, the Australian Defence Force, or a number of others, are an integrated, dedicated, and astute group of individuals who share a camaraderie unmatched in the corporate world. Their culture is one born of the ever-present threat of war and the necessity to trust one another with their lives. Despite a common mission to protect the lives and fortunes of those at home and abroad and a responsibility to respond to that mission, those who comprise today's international military units are individuals with diverse interests and personal goals. An enhanced appreciation for the individual's needs has spurred a dynamic change in the military training of today. Those involved in that training – possibly YOU as an instructional designer – must produce training that meets the requirements of the military as well as the needs of the individual. Today's servicemen and women volunteer to serve their country, but they expect something in return.

Among the challenges to instructional designers working within a military environment are: recognizing that ineffective instruction can have catastrophic consequences; creating training that addresses the needs of the military while considering the interests of the individual; designing for an environment that is constantly changing; using technology wisely when technology is evolving more rapidly than the ability to accommodate change; assuming the responsibilities dictated by one's role and relationship to the military (federal worker or contractor); designing for individual projects, which may be repurposed into other training products or delivery environments.

Instructional designers play a significant role in the transformation to accommodate the needs of today's servicemembers and move the military of

today to the military of tomorrow. This role requires the following: knowledge of learning theories and instructional strategies and how to use them effectively; understanding how to apply technology at the optimal level to meet the needs of the user in a wide variety of learning environments; ability to create a blend of learning solutions; ability to work within budget; understanding and appreciation of the military culture both at home and abroad as well as the culture of international forces; and the ability to communicate with clients.

This chapter presents some of the major issues and challenges for instructional designers and developers in international military communities, from classroom to combat environment. The chapter will help the reader gain insight into the roles and responsibilities of the instructional designers and developers who create training products for the military.

The chapter begins with an overview of the military culture and the role of instructional design and development within that culture. The next section addresses the changing roles and responsibilities of the military. The third section discusses a variety of challenges and opportunities facing instructional designers in the military.

The following section discusses international military visions for the future. Finally, the last section describes the role of instructional designers working with the military. A collection of application scenarios is included for the reader to apply the job aids. A glossary at the end of the chapter assists with terminology unique to the military environment.

Since the end of World War II, America's national protective force has evolved from national to global defense. Meeting the need to recruit and retain qualified personnel is a challenge for any country's military. In light of this need, the North Atlantic Treaty Organization (NATO) has established the NATO School Oberammergau (NSO), which provides training, hosts conferences, and conducts joint exercises for all NATO entities and selected partners. To date, more than 190,000 international participants have attended NSO (NSO, 2023). This global military evolution demonstrates the increased logistical demand for training across cultures and around the world.

Winning wars and providing security are only two components of the military mission. All the NATO allies are committed to peacekeeping efforts as well as providing humanitarian relief assistance. These commitments require well-trained men and women, and it is within the realm of training that instructional designers will have an opportunity to apply their knowledge and skills.

To work effectively in the military environment, instructional designers must understand and appreciate the transitions the military will make in the years ahead. Military training will evolve alongside this transition; the use of and emphasis on technology will have significant impacts on that training.

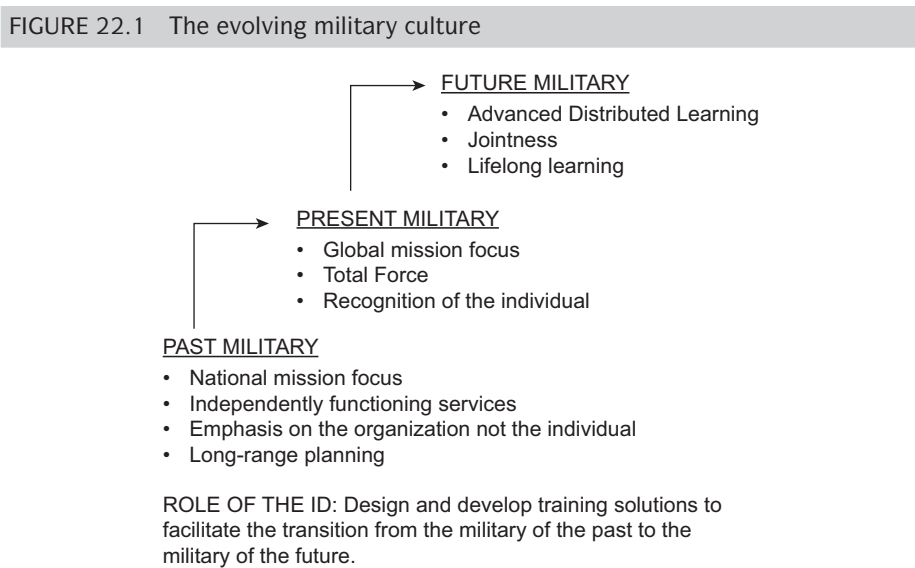
The military clients instructional designers work with are subject matter experts (SMEs) in their occupational fields. They are not usually familiar with educational principles, learning theories, or instructional technology applications. Their knowledge of the classroom and learning is based on their personal experiences as students. Their knowledge of technology is through experience in the workplace. They place a great deal of trust in the instructional design team to provide them with the best recommendations for how and when to apply a theory or a technology to achieve optimal learning solutions and to help them stay within the financial and environmental constraints. Instructional designers must "know their stuff," and they are expected to keep

abreast of the instructional technology field. Anything less is not in the best interests of the client or the design firm the team represents. Flawed designs or inefficient use of technology can result in hundreds of thousands of dollars wasted. Mistakes such as these will not enhance a company’s reputation or lead to follow-on contracts.

THE CHANGING ROLES AND RESPONSIBILITIES OF THE MILITARY

Over the years, the US military and other developed nations have evolved into huge, technologically sophisticated, multifaceted, integrated organizations with an overwhelming number of responsibilities. Figure 22.1 presents some of the changes in the focus in military culture.

Not only do the military of the various countries protect its own citizens, but they have assumed responsibility for protecting and defending the freedom of other nations. Additionally, with human and drug trafficking, and piracy on the open seas increasing, the United Nations Security Council has called on world navies to combat marine-based criminal gangs in UN Resolution, 2077 (2012). Similarly, the Australian Defence Force is deployed in more than 12 international operations, including border protection, UN and coalition operations, and third-country deployments, as well as providing humanitarian and disaster relief efforts. Their global reach is complicated, not only geographically but in communications and training with multinational forces, including the United States, Japan, China, Indonesia, Malaysia, Singapore, the Republic of Korea, India, and South Pacific countries (Australia Department of Defence, 2023). These added responsibilities have altered the lives of each nation’s soldier, sailor, or airman. These long-term global assignments impact personal lives and professional goals as never before. Instructional designers may be asked to provide learning solutions that will support training and learning opportunities both nationally and globally. Some of



the major issues associated with the changing roles and responsibilities of the military and the role of the instructional designer with regard to those changes are discussed in the following section.

CHALLENGES AND OPPORTUNITIES FACING INSTRUCTIONAL DESIGNERS IN THE MILITARY

The military of all nations will face a number of common challenges, many of which affect the work of instructional designers. In the following subsections, a number of these challenges are described as well as some suggestions for how to address them (i.e., turn them into opportunities).

International Responsibilities of a National or Multinational Military Force

The global corporate world thrives on international partnerships. Designers must recognize the cultural diversity of the clients and select training or learning solutions that can accommodate dissimilar audiences. Further complexities may be encountered when designing products that may be purchased by international forces. Many of the US allies purchase American instructional products and access to the training as well as the weaponry. The largest global conference for military training is the Interservice/Industry Training, Simulation and Education Conference (I/ITSEC) held annually in Orlando, Florida. Representatives from the armed services, transportation, Homeland Security, industry, academia, and various government agencies, as well as more than 2,000 international participants from over 60 countries, share the evolution of a total systems philosophy in the acquisition of training equipment and delivery systems.

New Technologies

New technologies exist on every front, in every business, and in every home. Students share classroom experiences with children around the world via the internet. Low-cost, digital communications have placed international friends and relatives within a finger's reach. These new technologies are also available to adversaries. Using secure networks and limiting the number of applications are two ways in which the military tries to prevent illegal access. But these security solutions may cause instructional designers to adjust the design and delivery of training products. Schatz and Smith (2022) address the US strategy for supporting the national security vision through the establishment of the DoD Learning Enclave. Training products for all armed services and government agencies will be housed within the enclave.

Funding

The challenge for each service in any country is how to best utilize the money it has available for training. In most instances, trade-off decisions must be made to stay within budget. A low-tech training solution, such as a paper-based job aid, may not be the most desirable approach, but may well be the option

selected to accomplish the training task and stay within budget. The desire to utilize all the capabilities of technology is a temptation that may be hard to resist, but using dollars injudiciously can quickly be the undoing of a design firm. For the instructional designer, suggesting new approaches to training using low- or high-tech methods incorporated with the mission equipment is an option that should be considered.

An instructional designer must be able to articulate carefully and accurately the cost of the training solution and provide alternative choices. Whatever funds are applied to one project may be taken from another; the designer must be able to help the client weigh the costs or trade-offs.

Technological Range

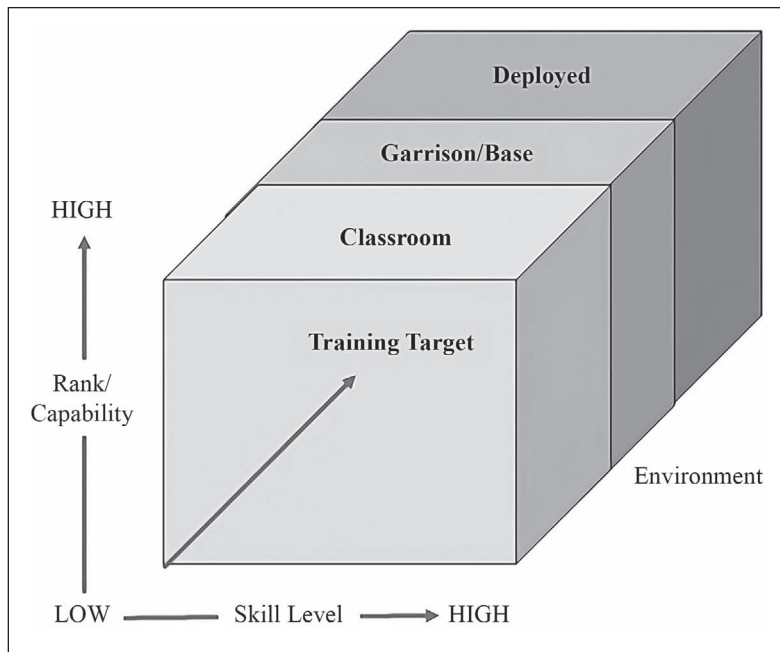
Instructional designers working with the military find themselves supporting the development of instructional products that range from the simplest paper-based, pocket-sized job aids to advanced, computer-based simulations and virtual training worlds. At the higher end of technology, the military employs the most sophisticated simulations in the world, such as combat fighter pilot simulations and large-scale virtual command and control exercises. The range of technology available to training developers presents ever-increasing opportunities to improve training realism and effectiveness while presenting an ever-expanding range of challenges to instructional designers as they work to adapt to the variety of instructional and performance requirements.

Delivery Environments

Like their civilian counterparts, members of the military must constantly learn new things to achieve professional success and survive in hostile environments. Except for new employee indoctrination or new equipment training, training in the civilian environment is generally separated from the workplace or jobsite. In the military, training is center stage; it is part of the job and is integrated into the workplace, which means it represents a larger proportion of day-to-day activities than in the civilian environment. Because of this, training in the military is pervasive; the quantity and diversity of training products tend to be much higher. Instructional designers must recognize that training takes place in the classroom, in garrison, on base or in shipboard environments, and wherever personnel are deployed – even in combat. This variable training delivery environment means training products must be adaptable to all environments.

Figure 22.2 uses a visual to address considerations a design team might use in initial conversations with the client. For instance, service members with less than three years are learning their occupations. They attend basic schools, which are focused totally on the curriculum. Skills training is on systems at the operational level. Work is closely supervised. As the servicemembers move up in rank and skill level, their professional skills transition to a tactical view of the ship or unit. They maintain and troubleshoot equipment. Additionally, they are expected to serve in leadership roles. Often they are expected to provide on-the-job training to new employees. Training and the systems on which they work become more complex. Leaving the ship or garrison is less likely to

FIGURE 22.2 Full-spectrum use of training products



occur because of organizational responsibilities. Training solutions must factor in skill level, work assignments, and deployments. Asking your client to clarify the tasks and the work environment or tempo will impact training solution recommendations.

Design Constraints

Large-systems design is an area that presents unique challenges to instructional designers. The larger and more widely dispersed the system, the greater the challenge. Designing for the military differs from designing for large corporations on a number of fronts: management, configurations, implementation, and expertise of training instructors.

The management philosophy within a large corporation generally follows a single directive from the board of directors. The military prides itself on the diversity and the mission scope of each of the independent services. Especially when working within the joint arena, the instructional design team may find itself trying to please a number of clients with strong, service-specific requirements. For instance, a joint-based training operation might elect to institute personal electronic books as a delivery medium. The joint base's network and security system support the initiative; however, each service requires that the electronic content be accessible for its own organizational network, which may or may not support the proposed solution. The design team must be able to recommend alternatives to meet both requirements.

The configuration component of any technology-based solution is probably the most difficult aspect of a project. Each service has its own network infrastructure(s) and equipment purchased over several years. In the majority

of cases, designers will work with legacy (existing) systems and with integrating new hardware and software.

Once a project has been completed and beta-tested in an ideal setting, the instructional design team may assist with implementation or provide instructions to the government's implementation team(s). Implementation presents unique challenges because it will more than likely be implemented in a variety of settings—in the field, aboard ship, and around the world as well as in the classroom.

Unlike major corporations that have training departments and professional instructors, the military uses subject matter experts and provides them with instructional materials to assist them with “teaching.” Instructional designers must create train-the-trainer materials that explain the lesson plans in a step-by-step manner and incorporate learning theory as well. The US military recognizes Master Instructors, and while assignments are short-lived (no longer than three years) instructors need materials that clearly explain all components of the learning package, including the theories underlying the design.

People

The most critical challenge to all the services is recruiting good people and retaining highly trained and skilled service members. The national defense planning documents of many of the allied nations address the need to recruit and retain highly qualified people (Australia's 2022–26 Defence Corporate Plan, the UK's Defence in a Competitive Age, the US National Defense Strategy, 2022). These plans also recognize the need to provide for quality of life, especially in the areas of personal and professional growth. As an instructional designer, you might be asked to research international organizations and identify learning-based retention strategies to implement on a broad scale.

Alternative Training Solutions

Instructional designers are accustomed to examining the skill and knowledge levels of the target audience to determine how to design the instruction and what level of language to use. Particularly important is the instructional designer's knowledge of learning theories and instructional strategies. Historically, training has been designed for and delivered to the “group.” Servicemembers who did not achieve the desired performance during the first iteration of training were remediated until mastery was achieved. This remediation was often done in the manner in which the original instruction was presented.

In the case of remediation activities, rather than presenting the same information in the same format or the same information in a slightly different format, the instructional designer might recommend a completely different approach which allows the training system to track and recommend instructional sequences. A good example is the US Air Force's Experience Application Programming Interface (xAPI), which it has integrated into its Live F-15E Flight Training (2022). Research to date indicates integration is beneficial in tracking behaviors and performance across diverse platforms in live training exercises (ADL, 2022).

The technology options now available to instructional designers afford them opportunities to recommend varied training solutions that address a variety of instructional challenges at the individual level. Take, for instance,

a scenario in which a computer-based training product has been ordered to replace the resident classroom instruction for food service specialists in the Army. An examination of the ethnic composition of the target audience reveals that a large number of Hispanic/Latino soldiers are in that occupational specialty. Technology access studies indicate that members of that community come to the workplace with less computer experience than any other ethnic group (Geraghty et al., 2021; Katz & Levine, 2015; McGee, 2002). Hofstede's 1997 work (as cited in McGee, 2002) in cross-cultural theory is the basis of web-based design that specifically addresses culturally-based instructional considerations for this community. These considerations include minimal emphasis on individual achievement; active learning; simple, straightforward design; consistent and repetitive visual cues; and an intimation of consequences before taking action or making decisions (McGee, 2002). The instructional designer might suggest to the client a blended solution that provides team-based review sessions, laboratory assignments, or PC simulation-based experiments. The computer software program or adjunctive materials would use minimal graphics and increased white space. Visual cues would orient the learner throughout the program and assist with intuitive navigation features. And finally, the program would allow the learner to select and access alternatives before making final decisions. Designing instruction that adheres to the culturally-based instructional considerations specific to the Hispanic/Latino community increases the likelihood that these learners will succeed.

THE MILITARY'S VISION FOR THE FUTURE

Guiding Documents

Each country has a number of documents which are written by the military, describe their vision and goals for the future, and are submitted to their governing body. In the case of the US, the National Defense Strategy (2022) articulates the military's posture for capabilities that will be needed in the future to defend the homeland; deter strategic attacks against the US, allies, and partners; deter aggression; and build a resilient joint force and defense ecosystem. This document establishes the vision for all efforts by each of the individual services. Each service must examine its current means of doing business and transform itself against the measures provided in the NDS.

The vision statements written by each service in alignment with the NDS are excellent starting places when working as an instructional designer creating training for the military. A familiarity with the visions and plans of the branch of the military will aid the instructional designer in the quest to provide the best training solution possible. Many of these planning documents are available via the internet by visiting the country's Department of Defense website.

Long-Range Planning

By the time a plane or ship is designed, prototyped, and ordered, the technology has surpassed the original plans for the aircraft or ship. An instructional designer must be able to "look into the future" and provide input as to how technology and learning research may evolve and the impact this evolution

will have on future training needs. The key to the future of military training lies in three major areas: Advanced Distributed Learning; jointness, within a nation and internationally; and lifelong learning.

Advanced Distributed Learning (ADL)

The Advanced Distributed Learning (ADL) Initiative, sponsored by the US Office of the Secretary of Defense (OSD), is a collaborative effort between government, industry, and academia to establish a new distributed learning environment that permits the interoperability of learning tools and course content on a global scale. ADL's vision is "to provide access to the highest quality education and training, tailored to individual needs, delivered cost-effectively anywhere and anytime" (ADL Governance, 2017).

Initially a US endeavor, ADL encompasses an international membership with ADL Partnership Labs in Canada, Korea, Latin America/Caribbean, NATO, New Zealand, Norway, Poland, Romania, Serbia, and the United Kingdom. The partnership network collaborates on developing and delivering technology-based education, training, and personnel development. The work focuses on enhancing distributed learning research, implementation, and policy guidance in military and national government contexts.

The partnership network helps expand access to quality education and training (anytime, anywhere); it strengthens international ties, and it creates a community for sharing requirements, establishing common standards and specifications, exchanging lessons learned, and conducting collaborative research and implementation projects related to distributed learning. For instructional design students, these partnerships provide an infinite number of learning and professional growth opportunities (Partnership Network, 2023). IDs are expected to stay abreast of academic research and commercial innovations. Much like in the military setting, it's your knowledge of research-based theories and technological advancements as well as your ability to translate that information for decision-makers that brings value to the agency or country. Partnership teams have led the way in establishing open-source, online learning management systems around the world; building the Enterprise Course Catalogue (ECC) to enable a defense-wide inventory of all DoD training and education resources; and establishing an open-source eBook platform that combines mobile device technologies, social learning, and eBooks to present interactive instructional content to learners on cell phones in developing nations.

Jointness

Maximum advantage of funding, acquisition, technology, and people can be attained through collaboration. The US military and its allies fight as a combined force – an integrated whole of the service branches and the ally counterparts. This collaboration dictates that training be joint as well, necessitating training products that are developed to enhance the joint war-fighting skills of disparate forces. Inherent in this instructional design mission is recognition of the diversity of the force in terms of service perspective (i.e., Army, Air Force, Space Force, Navy, and Marines), doctrine of allied forces (such as the case in NATO or UN coalitions with many different national armed forces and their

associated war-fighting strategies and tactics), and even cultural diversity, such as differences in language and religion.

Lifelong Learning

Military leadership supports and encourages learning beyond the military requirements for a number of reasons. Continued learning opportunities within the service improve the servicemember within his or her occupational specialty and open the doors to many opportunities for those who leave service. The UK offers advanced learning opportunities through its resident universities and the Open University. Its government has an established Lifelong Learning Policy for its citizenry, and its military component is the Learning Forces Initiative that is open to all ranks (Serving Soldier, 2004).

The European Union (EU) has instituted Europe-wide educational reforms to allow students to “study without borders.” The European Credit Transfer System (ECTS) simplifies accreditation between institutions. This open system allows any EU citizen, including military students, to continue their personal learning goals without the restrictions of geographical boundaries (European Pillar of Social Rights, Principle 1).

The words of the former US Chief of Naval Operations, Admiral Vern Clark, evidence a respect for and recognition of the individual’s learning goals:

The people that make up our military decide that they are going to give of themselves. Every human being who puts on the uniform . . . makes tremendous sacrifices. . . . There should be a commitment from the leadership for the promise sailors make to us. I believe that promise has to be kept by people like me – to make sure people have the tools that they need to succeed. We’ve got to offer to them a chance to make a difference. They want us to give them a chance to show what they can contribute. They want a chance to grow and develop.

(Kennedy, 2000)

In recent years, military leadership has recognized that supporting servicemembers extends beyond technical or leadership training. You might be asked to work on designing and delivering a financial literacy program for spouses or implementing a techno-hub for teens at the after-school center on base.

THE ROLE OF INSTRUCTIONAL DESIGNERS WORKING WITH THE MILITARY

The instructional design profession prides itself on creativity, ingenuity, and research. That means the instructional designer can and should suggest several innovative solutions. A novice instructional designer working with a military client might assume that the “bank” would have open doors for funding spectacular projects. That is not the case. Limited funding will require trade-offs for every project. Using a technique similar to that of the Quality Function Deployment model for instructional design (Bratton-Jeffery & Jeffery, 2003), the Scenarios Solution Discussion Matrix (see Figure 22.3) suggests a systematic methodology for working through the trade-offs that can serve as the basis of discussion between the instructional designer and the client.

FIGURE 22.3 Scenarios Solution Discussion Matrix

REMEMEER: When designing and developing training solutions for the military, the instructional designer must take into account design considerations as well as specific human- and technology-related issues unique to the military environment.

		Design Considerations				
		Learning Theories	Technology Applications	Blended Solutions	Budget	Military Culture
Design Issues	Funding					
	Long-range Planning					
	Joint Training					
	Low-tech vs. High-tech					
	Delivery Environment					
	Alternative Training Solutions					
	Design Constraints					
	Motivation					
	Cultural Diversity					
	Knowledge Levels					
	Skill Levels					
	Learner Past Experience					

Application Scenarios

As you examine the application scenarios, identify what you know, make a list of questions to ask your client, and list possible solutions based on instructional technology practices and theories. Use the Scenarios Solution Discussion Matrix to guide your thinking. Be sure to consider areas in which the instructional designer will have been involved when reviewing the solutions.

SCENARIO 1: DEGREE COMPLETION VS. DEPLOYMENT Army Reserve Sgt. John King faces a 12-month rotation overseas as a member of his Reserve unit. His unit, along with a signal battalion from the state’s National Guard, will support coalition forces in promoting stability and safety in the war-torn region. Sgt. King’s company will be part of a larger force designed to patrol and collect information.

Sgt. King currently works for a large corporation that has been paying for his college work in business management. To advance in the company, he must complete his degree. Unfortunately, the deployment will now interrupt his efforts and jeopardize his place in the company. The big question in Sgt. King's mind is what will happen to his personal goals as he takes time from his career to serve his country overseas.

PROBLEM You are a member of an instructional design team that has been formed to address deployment and distance learning options. Identify strategies that will meet the needs of the individual servicemember, like Sgt. King, while serving the requirements of the organization.

THE ARMY'S SOLUTION Sgt. King is representative of the new Army, in which soldiers are expected to be educated and technology-savvy enough to succeed in the missions and on the battlefields. The Army's training model is "train-alert-deploy-employ." Training, in addition to combat tactics, includes language, cultural awareness, and regional expertise education (Field Manual 1, August 2021). Individual services launched online learning opportunities in the late 1990s. In 2010, Defense Information Systems Agency, the Defense Acquisition University, and ADL launched Joint Knowledge Online (JKO) to support DoD training. JKO's goal is to produce immersive, media-rich training that stimulates cognitive, intuitive, innovating, and adaptive thinking for complex decision-making skills (JKO, 2010).

SCENARIO 2: JOINT TRAINING US FORCES A joint task force has been formed with the mission to support port security activities at ports on the Gulf Coast. The task force comprises elements from the Air Force, Navy, and Coast Guard. The Coast Guard will have operational control and will coordinate with the Department of Homeland Security.

Proficiency in communications with civil agencies and aviation and marine assets has been identified as a training issue. While the Coast Guard members are well-trained and experienced in the communications procedures of civil agencies such as the police and emergency services, as well as commercial aviation and marine resources, the military services are not as familiar with these communications networks. Task force members from the armed services will receive training on these non-military communications procedures in order to coordinate security activities.

PROBLEM You are a member of an "assembled team" of representatives from each of the services as well as a number of design firms. The team has been charged with finding a means of training all the forces as a single, ready-response unit. What are the various methodologies that present the most realistic training scenario possible and utilize technology advances both in weaponry and in evaluation of the training?

THE DEPARTMENT OF DEFENSE'S SOLUTION The Department of Defense requires that every service be prepared to fight in an urban setting and to be able to conduct humanitarian and peacekeeping efforts. Eglin Air Force Base, in the panhandle of Florida, is the site of an urban combat and anti-terrorism training center for Military Operations on Urbanized Terrain (MOUT). This

facility replicates a city in which America's military and its allies train in all facets of this new type of warfare – switching from humanitarian to combat at a moment's notice (Blair, 2004). The Marines have a similar facility located at Quantico, Virginia. According to Capt. David Moon, commander, B. Company, "With the complexity of today's operating environment and the growth in large urban hubs this is the focus for the future. Although there is still importance on conventional warfare, a lot of the wars are fought in the urban environment" (Davis, 2015).

CONCLUSION

Although working as an instructional designer in a military environment is challenging, it provides an exceptionally rich opportunity for growth as a professional. The knowledge of learning theories and instructional strategies that will be needed can be employed in virtually any manner: instructor-led or instructor-facilitated classroom, informal self-study, formal online learning courses with synchronous and/or asynchronous options, or a blend of any or all of these.

Many of the challenges the instructional designer faces in a military environment, however, require skill sets that go beyond the basic information learned in either a formal or an informal study program. Perhaps most daunting of these is acquiring an understanding and appreciation for the military culture. There is a steep learning curve that encompasses everything from familiarity with ranks to military protocols – things that are not directly related to instructional design. Also, it is virtually impossible to "bend the rules" when working with the military, and designers face scheduling deadlines and budgeting constraints that require tremendous productivity in record time at a minimal cost to the taxpayer. This can make the instructional designer's job particularly stressful.

A greater emphasis on the professional needs of the individual in tandem with the requirements of the organization, budget limitations, and quickly evolving technologies are all goals that make a career as an instructional designer in the military education and training environment challenging but rewarding. Instructional designers who work in the military environment are never bored and, given enough time, will have the opportunity to work in every aspect of instructional design, from analysis to evaluation.

Summary of Key Principles

1. **Genuinely respect and appreciate the roles and responsibilities of your clients and the organization they support.** You'll find that military customers are generally very direct and decisive. At times, you may find yourself waiting on the SMEs to review deliverables. It can be frustrating, but know that your SMEs put mission first and all else is secondary. Developing backup plans and alternate approaches that can be implemented quickly should be standard tools in your ISD toolkit.
2. **Research the organization's vision and direction for the future.** Use your knowledge to help them ride the learning waves. Just as the SMEs are experts in their field, so are you in the realm of instructional design, learning strategies, and the use of technology to enrich the learning process. Your clients will rely on you to provide input about

how to organize or convey information, how to select appropriate or implement strategies, and to help them understand the complex world of instructional technology.

3. Use the language of the customer to convey or illustrate your strategies.

As instructional designers we pride ourselves on our ability to communicate. We learn the customers' jargon to develop the content, yet we expect the customer to learn our jargon to understand the terms of the contracts or the design approaches. Using analogies or metaphors familiar to the client goes a long way in team building and developing a common understanding.

Military leadership trusts the instructional design team to make the best recommendations for how and when to apply a theory or a technology to achieve optimal learning solutions. As you grow in your profession, it is imperative that you stay current with the theories and technologies.

4. Respect leadership's requirement for cost-effective solutions. Study the training requirement within the legacy environment and suggest solutions which leverage current assets or incremental or iterative evolutions. Recognize that for the military, training is not separate from the job. It is a critical component of the job.

Application Questions

1. You've been asked to assist an organization that is establishing computer-based training opportunities for the military system in a developing nation. Prepare a short briefing paper (1–2 pages) of the considerations and constraints for program implementation. Use the Scenarios Solution Discussion Matrix (Figure 22.3) to assist you with framing your answer.
2. Your client wants to use technology in its training program; however, the field of operation does not always provide electronic access. What are alternatives you might suggest for a successful program? Use the Full Spectrum diagram (Figure 22.2) to guide

your thoughts. Prepare a table that provides the learning outcome and a comparison of the technology-based strategy with one or more complementary alternatives, including capability, skill level, the delivery environment, and development issues or constraints.

3. Humanitarian efforts are a major role for the militaries of many countries. Prepare a list of web-based and mobile application training materials to assist servicemembers charged with learning how to conduct relief efforts. Consider checking websites and commercial applications for first aid, disaster or famine relief, wildfires, etc.

Glossary

Active duty. Servicemember is assigned to an active unit and serves full-time as a member of the regular force.

Advanced Distributed Learning. A federal initiative that supports a collaboration of government, academia, and

industry to provide a philosophy of accessibility, durability, interoperability, and reusability in network and software solutions.

Deployment. The active force moves from its standing residence within the United States to an overseas location for a designated period of operation.

Jointness. The term exemplifies the independent US services (Air Force, Army, Marine Corps, and Navy) operating as an integrated force sharing resources, personnel, and operational missions.

Joint Vision 2020. The military document which defines the vision and requirements of the armed forces in the future. The Joint Vision is published in ten-year increments, e.g., 2010, 2020, 2030.

Total Force. All those who work with the US military, including active duty, reserves, National Guard, and federal employees.

Role of the ID. Design and develop training solutions that facilitate the transition from the military of the past to the military of the future.

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What Should IDs Do to Advance Health Professions Education?

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Ongoing advances in technology coupled with the exponential accumulation of information continue to challenge educators across disciplines. In health professions education (HPE), the amount of medical knowledge is said to double every 73 days (Page, 2023), making it increasingly difficult for educators to decide what to include in the curriculum. Concurrently, the market for educational technology is projected to grow from \$85.43 billion in 2021 to \$169.72 billion in 2028 (Fortune Business Insights, 2021).

To address the technological and pedagogical challenges, an increasing number of health professions (HP) educators are turning to experts in instructional design to help analyze, design, develop, deliver, evaluate, and improve HPE (Love et al., 2019; Hirumi, 2021). For instructional designers (IDs), including educational and cognitive psychologists, educational technologists, curriculum developers, multimedia specialists, experience designers, and other learning specialists, the skills, knowledge, and dispositions continue to evolve and may differ from those necessary to be successful in other industries (Anderson et al., 2019; Hirumi et al., 2020; MacLean & Scott, 2011; Stefaniak, 2020; Wang et al., 2021). The question is, what should IDs do to advance HPE?

The purpose of this chapter is to help IDs prepare for jobs in HPE and to inform educators across health professions on what IDs can do to facilitate collaboration and evidence-based education. To achieve our purpose, we review literature on the development of competencies for IDs practicing in higher education in general and in HPE specifically. We then summarize the results of a survey and interviews of practicing IDs and HP educators, and an analysis of job announcements to determine what tools and techniques IDs

use as a foundation for making recommendations for IDs engaged in advancing HPE.

WHAT DO WE KNOW ABOUT ID COMPETENCIES?

Instructional design (ID) competencies are the skills, knowledge, and dispositions (SKDs) that IDs need to create meaningful learning experiences. Various organizations have posited frameworks for the preparation and professional development of IDs across settings, such as those published by the International Board of Standards for Training, Performance and Instruction (IBSTPI), the International Society for Performance Improvement (ISPI), the Association for Talent Development (ATD), the Association for Educational Communications and Technology (AECT), the International Society for Technology in Education (ISTE), the Online Learning Consortium (OLC), and the University Professional and Continuing Education Association (UPCEA).

For this chapter, we define competency as “an integrated set of skills, knowledge, or attitudes that enables one to effectively perform the activities of a given occupation or function to the standards expected in employment” (Richey et al., 2001, p. 31) and focus on frameworks published by ATD and IBSTPI, which center on IDs, rather than others which emphasize the role of the educator and technology.

The ATD Talent Development Capability Model consists of three domains: Developing Professional Capability, Impacting Organizational Capability, and Building Personal Capability. The Developing Professional Capability domain “embodies the knowledge and skills talent development professionals should possess to be effective in their roles of creating the processes, systems, and frameworks that foster learning, maximize individual performance, and develop the capacity and potential of employees” (Association for Talent Development, 2019, para. 1) and posits competencies associated with learning science, instructional design, training delivery and facilitation, technology application, knowledge management, career and leadership development, coaching, and evaluating impact.

Similarly, IBSTPI posits 22 competencies in five domains (i.e., Professional Foundations, Planning and Analysis, Design and Development, Evaluation and Implementation, and Management), along with 105 statements that distinguish three levels of competency (i.e., Essential, Advanced, and Managerial) to track the growth of IDs and allow for a more comprehensive assessment of their competencies (Instructional Design Competencies and Standards for Teachers, Trainers, and Industry Professionals [IBSTPI], 2012). IBSTPI also published a Code of Ethical Standards for IDs (Richey et al., 2001) that provides insights into what IDs should (and should not) do that are divided into four sets of standards related to Responsibilities to Others, Social Mandates, Respecting the Rights of Others, and Professional Practice.

ID competencies have been studied in different ways to inform the field (e.g., Klein & Kelly, 2018; Guerra-López & Joshi, 2021; Giacumo & Breman, 2021). In a recent, in-depth study to update ID competencies across settings, Wang et al. (2021) used a conceptual framework validated by Ritzhaupt et al. (2010, 2021) and Ritzhaupt and Kumar (2015) to complete a content analysis of 1,030 job announcements that revealed 80 knowledge, 43 skill, and 62 ability statements. They then applied exploratory factor models

to identify the most frequently cited competencies within each domain (i.e., knowledge of *instructional design models and principles*, *e-learning development*, and *online teaching and learning*; skills in *collaboration*, *content development*, and *oral and written communication*; and the ability to *develop course materials*, *create effective instructional products*, and *advise and consult with subject matter experts [SMEs]*).

In HPE, IDs encounter distinct obstacles and opportunities. Anderson et al. (2019) emphasize that IDs have proficiency in creating educational content and should actively participate in curriculum planning and pedagogical research to inform their work. Curriculum development, in turn, necessitates a grasp of medical ethics and terminology, clinical protocols, and patient care. Likewise, the incorporation of technology should be tailored to meet the unique requirements of HPE, such as the utilization of simulations for surgical practices or the implementation of virtual patient case studies.

From an educator’s perspective, Chen and Kleinheksel (2021) identify six ways healthcare professionals may leverage the expertise of IDs: (a) by familiarizing themselves with the [ID&T] field, (b) embracing a systems perspective, (c) adopting a disciplines approach, (d) collaborating early, (e) soliciting administrative support, and (f) cultivating collegial interdisciplinary partnerships. Likewise, the Health Education Teacher Instructional Competency (HETIC) framework elucidates pedagogical competencies for facilitating school health (Szucs et al., 2021). Although targeted for educators, the framework offers further insights into what IDs should do to advance HPE, such as using personalized adaptive methods, wherein learning resources are customized to cater to the unique needs of individual students.

LEARNING MORE ABOUT HOW IDS CAN IMPACT HPE

Information from three sources was gathered to further inform our discussion of how IDs can impact HPE. Table 23.1 depicts the primary findings from surveys, interviews, and job announcements. A detailed explanation of the analysis method and findings for all three information sources with figures and tables depicting the results are available upon request.

The survey asked questions about background and job setting, the use of specific design tools and techniques, and how IDs should advance HPE. Respondents included IDs, learning specialists, educators, and researchers who work in medical schools, pharmacy, nursing, and health science schools. Table 23.1 lists the specific analysis methods, design and development tasks, design models, and tools utilized by IDs across HPE, including the percentage of respondents who specified the use of each tool and technique.

Four educators and six IDs were interviewed and asked to summarize a recent ID project, identify the roles and responsibilities of the project team members, and discuss what they felt IDs should do to advance HPE. Table 23.1 summarizes the six themes that emerged from the analysis.

Fifteen job announcements posted to Inside Higher Ed, HigherEdJobs, and the DR-ED listserv were examined to triangulate findings from the survey and interviews and further inform our discussion. Topic analysis highlighted the importance of three sets of skills, knowledge, and abilities as described in Table 23.1.

TABLE 23.1 Summary of Findings Derived From the Survey, Interviews, and Job Announcements

Survey (N = 70)	Interviews (N = 10)	Job Announcements (N = 15)
Analysis tasks • Needs assessment (83%) • Goal (50%) • Subordinate skill (40%) • Learner (80%) • Context (50%) • Other analyses (14%) Design & development tasks • Technology (70%) • Multimedia (57%) • Software req (20%) • Clinical cases (67%) • Curriculum (79%) • Other D&D tasks (11%) Other job tasks • Manage projects (77%) • Facilitate change (76%) • Formative evaluations (67%) • Summative evaluations (57%) • Conduct research (47%) • DEIA (61%) • Other job tasks (11%) Design models • ISD/ADDIE (63%) • Spiral (14%) • Agile (40%) • Rapid prototyping (43%) • Other models (10%)	1. Infiltration. Visibility, collaboration, and making yourself known, connecting with colleagues, and fostering global collaboration among IDs. IDs need to be proactive in networking and building relationships within the field. 2. Bridging theory and practice. Effectively communicating fundamental ID principles and practices. Establishes credibility and helps build trust, leading to more informed and reliable ID decisions. 3. Navigating roles and responsibilities. Recognize their roles in R&D and process improvement. Empower IDs to exert a meaningful influence on the quality of education within this domain. 4. Cultural integration. Importance of blending into the established culture. Work harmoniously with content experts and technologists. Not only being part of the culture but also understanding one's role clearly within it. 5. Agility. Acknowledge no one-size-fits-all. IDs need to be agile, flexible, and adaptable, and allow the educator to choose their preferred approach, which can be challenging.	Knowledge of: 1. Educational technologies and faculty: Understanding how educational technologies interface with faculty roles in learning sciences. 2. Online learning platforms: Familiarity with learning management systems (LMS) and multimedia formats for the delivery of online courses. 3. Pedagogy and curriculum design: Expertise of current educational theories and research and how they inform the latest developments in curriculum design. Skills in: 1. Faculty support: Understanding work requirements, identifying needs, and offering consultations and professional development. 2. Instructional design. Broad knowledge of ID principles and practices, including alternative design tools and techniques, and various theoretical and empirical foundations. 3. Communications: Excellent oral and written communication skills, including presentation and teamwork skills.

(Continued)

TABLE 23.1 (Continued)

Survey (N = 70)	Interviews (N = 10)	Job Announcements (N = 15)
Tools • Multimedia dev (73%) • Learning management system (81%) • Content management system (37%) • Course/authoring (56%) • Assessment (41%) • Clinical decision support (36%) • Learning platform (31%) • Coding/program (19%) • Other tools (18%) Key areas of competency • Instructional design & feedback • Development and assessment • Tech integration • Interprofessional learning & curriculum development • Research • Professional development	6. Persistent, proactive and communicative. Advocate for their work, engage stakeholders, and stay persistent in pursuits. Ensure success by fostering collaborative relationships, informed decision-making, and innovative solutions. Open communication to understand partner needs, facilitate design processes, and establish strong working relationships.	Ability to: 1. Manage instructional development projects: Skills in administering educational initiatives involving curriculum creation and the implementation of new instructional strategies. 2. Design adaptable learning experiences: Creating adaptable learning experiences and demonstrating flexibility and creativity. 3. Collaborate with faculty: Work with faculty in person and online to create online courses and instructional materials, pointing to the increasing importance of remote or digital education platforms.

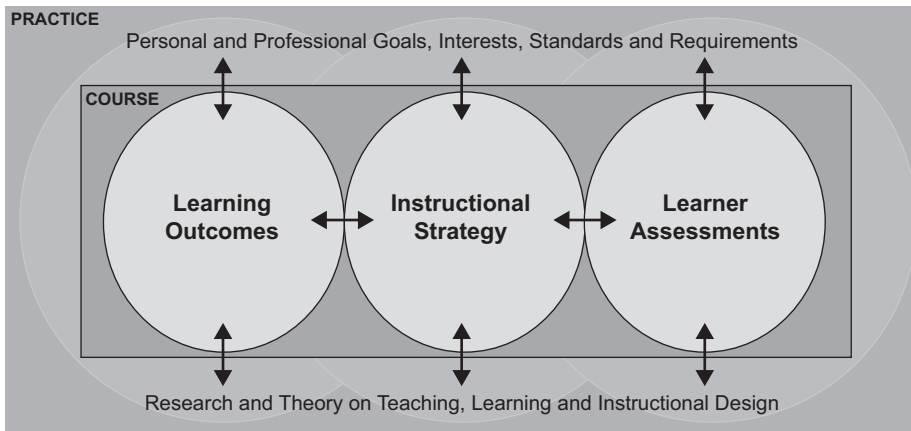
HOW CAN IDS ADVANCE HPE?

IDs come from diverse backgrounds to work in an array of HPE settings and occupy a spectrum of roles such as performance analyst, project manager, strategic and learning consultant, researcher, instructor, writer, project manager, media and web developer, trainer, evaluator, and asset manager. Keeping in mind that the application of ID competencies varies by institution and project, we discuss recommendations for the practice of ID across HPE.

Recommendation 1: Follow fundamental ID principles and practices to align instructional elements and promote learning effectiveness, efficiency, and engagement.

Figure 23.1 depicts three fundamental alignments that are vital for learning effectiveness, efficiency, and engagement and are characteristic of high-quality education: (a) the horizontal alignment of the three instructional elements (i.e., learning outcomes, content, and assessments); (b) the vertical

FIGURE 23.1 Alignment of the fundamental element of instruction (i.e., outcomes, assessments, and instructional strategy, including the chunking and sequencing of content information) with each other and with personal and professional goals, and with research, theory, and best practices to ensure quality of learning experiences and materials



alignment of the three elements with research, theory, and documented best practice; and (c) the vertical alignment of the three elements with personal and professional goals.

The application of fundamental ID principles and practices remains at the core of what IDs should do to advance HPE. Systematic design, starting with the end in mind, uses the outputs of one design task as inputs for proceeding tasks to help ensure the efficiency of the design as well as the teaching and learning process (e.g., using analysis results to define objectives, objectives to define assessments, and so forth). By aligning learning strategies (including the chunking and presentation of content information) and learner assessments with the defined outcomes, students, teachers, and IDs can concentrate their time and effort on explicit expectations and requirements.

The alignment of the three instructional elements with research, theory, and documented best practices helps ensure the effectiveness of learning by basing design decisions on empirical evidence. The use of research to inform decision making is not new in ID, just as it is not in the other sciences. For instance, grounded design, “[t]he systematic implementation of processes and procedures that are rooted in established theory and research in human learning” (Hannafin et al., 1997, p. 102), has been fundamental to ID and to calls for evidence-based medical education (EBME).

A prime source for facilitating EBME is the Best Evidence in Medical Evidence (BEME) Collaboration, “an international group of individuals, universities and professional organizations committed to the development of evidence-informed education in the medical and health professions” (AMEE, 2023, para 1). BEME’s goal is to disseminate the latest findings from scientifically grounded studies that enable teachers and administrators to make informed decisions about evidence-based practices that boost learner performance on valid and reliable cognitive and clinical measures. Working with librarians, using citation managers, and becoming familiar with publication

guidelines, impact factors, metrics, and open and paid access journals also facilitate EBME. A quote from one of our interviews epitomizes the IDs’ role in facilitating evidence-based design:

We do what we have learnt in the past. . . . However, we kind of expect the instructional designers to codify and formalize the theoretical stuff, which is mysterious to me. How do learners learn?

(Associate Professor of Medical Education)

The alignment of learning outcomes, strategies, and assessments with personal and professional goals is a key characteristic of high-quality education that helps promote learner engagement. For instance, IDs may apply the ARCS model of motivational design to determine whether instruction (a) gains and sustains learners’ Attention, (b) is Relevant to learners’ needs, (c) fosters Confidence, and (d) Satisfies learners’ expectations (Keller, 2010). IDs should be prepared to apply different motivational tactics, as prescribed by the ARCS Model (Li & Keller, 2018), along with other approaches for engaging learners, such as the use of story, game, and play to advance HPE (Hirumi et al., 2018, 2021).

Emerging educational technologies and innovations, such as augmented, virtual, and mixed reality; data analytics, AI, and machine learning; and blended, active, and mobile learning may enhance student learning and performance across HPE. However, if the elements of instruction are not aligned to each other, with underpinning evidence, and with learners’ goals, pedagogical and technological innovations may not be sufficient for promoting learning effectiveness, efficiency, and engagement. Another quote from the interviews further illustrates what IDs should do to advance HPE:

[To facilitate learning], we definitely had to help the faculty rework some of the objectives and outcomes . . . and then, condensing or chunking the contents so they were aligned to the intended learning outcomes.

(Leader of the Learning Design Team)

Recommendation 2: Use project and change management to navigate complexities in HPE contexts and cultures.

Facilitating multiple HP projects takes considerable coordination. IDs may be called upon to play the role of both project and change manager to make sure design initiatives meet objectives on time and on budget. As noted by Ritzhaupt and Kumar (2015), project management, including the use of software to allocate resources and monitor progress, can greatly reduce stress among participants. IDs should also be prepared to undertake change, utilizing change management tools and techniques to increase stakeholders’ adoption of potentially innovative learning technologies, along with fundamental ID practices.

To facilitate change in HPE, IDs should take an agile approach to design. Not all design projects warrant faculty members to go through the entire ADDIE process. Rather, IDs should help HP educators articulate curricular needs and apply agile means to address the needs. For example, it may be more feasible to discuss a menu of design options (as depicted in Figure 23.2) and then form small teams who take short sprints to complete selected design

FIGURE 23.2 Sample menu of optional systematic design tasks

Design Tasks	Resulting Products
■ (Re)Design program, course, or experience	Curriculum map depicting objectives, assessments, and instructional at rategy (including contents and resources) for a program, course, or experience
■ Define or refine objectives	Measurable st atements that communicate desired performance outcomes and the relationship between relevant skills, knowledge, and dispositions
■ (Re)Design and align assessments	Assessment inst ruments and criteria that are aligned to objectives, including pre, practice, and post-tests.
■ (Re)Design instructional strategy	Recommended sequence of synchronous and/or asynchronous learning events and activities, including chunking of content information and use of resources
■ Integrate emerging technology	Recommendations, requirements, and st rategies for integrating emerging technologies to facilitate learning, including access, training and job aides
■ Curate and/ or develop materials	Digital (multimedia) and/or print-based instructional materials acquired or created to facilitate achievement of specified learning outcomes and objectives
■ Acquire, appraise, apply evidence	Learning strategies and/or principles based on research, theory, and best evidence related to targeted learning outcomes, theory, and/or approach
■ Conduct formative evaluations	Recommended improvements based on testing of instructional materials prior to implementation to ensure accuracy, engagement, alignment and feasibility
■ Conduct summative evaluations	Recommended improvements based on students use, reactions, learning, transfer, and/or impact during successive implementations

tasks rather than trying to complete all design tasks associated with an ID model in one project. In other words, the application of fundamental ID practices can be seen as an evolutionary process where key stakeholders build on small successes to generate high-quality educational programs.

One specific design task that saves time that was highlighted by multiple information sources is to repurpose existing educational materials and methods. Due to the highly technical nature of HPE, both educators and designers noted the value of studying published examples to avoid having to reinvent the wheel. IDs looking to repurpose pre-existing resources should know to review examples posted on MedEdPORTAL (www.mededportal.org).

Facilitating change in such an agile manner is particularly important across HPE because HP educators and SMEs have numerous high-stakes job responsibilities that compete for limited time allocated to creating and refining coursework. In turn, understanding how projects, teams, and individual roles may differ by organization is essential for facilitating change. As noted by our interviewees, ID positions vary in scope ranging from a “complete . . . new build of the entire doctor of medicine [program]” to using tools “to make interactive videos,” and “create new elective courses.”

To advance HPE, IDs should be prepared to address the varying needs and perceptions of faculty and administration. Although professionals in education or related fields have been helping prepare physicians for over 80 years, the hiring of IDs along with adoption of ID principles and practices may be

relatively new. In a highly technical field, where SMEs may find it difficult to see how people outside their discipline can interpret such complex content, IDs must address faculty members’ and administrators’ disposition toward ID and IDs to succeed within the organizational culture.

Another key concept associated with facilitating change stressed by interviewees and prescribed by professional accrediting agencies such as Liaison Committee on Medical Education (LCME) (e.g., Standards 1 and 8) is having the key stakeholders (namely, faculty and students) design their innovation. The chances of an intervention being adopted and used as planned increase greatly if the end users lead the design process.

What has taken me a few years to do is to basically make sure they know who I am and what I do and what I can provide for them. I say infiltrate. I push to get invited to planning meetings. So even if I don’t say anything in those meetings, I’m at least there, and I can chime in if I have something to add, and I can say here’s what I can do for you. Here’s what I can offer.

(University Director of Instructional
Design and Learning Innovation)

Recommendation 3: Foster collaboration, interpersonal communications, and transdisciplinary teamwork.

Due to the highly specialized nature of the content, more SMEs are typically involved in course design and delivery across HPE than other settings. As such, IDs should be prepared to foster collaboration by developing exceptional interpersonal communication and transdisciplinary teamwork skills. The design team process requires careful planning and time allotment to invite the appropriate professionals to form an effective team, determine roles, establish protocols, and reach consensus to prepare, pilot, and improve educational methods and materials. Transdisciplinary decision making, which is becoming more prevalent with the development of interprofessional education and health systems science in HPE, is also time-consuming. Team members must learn each other’s vocabulary and areas of expertise while also transforming their own practices to achieve team and organizational goals.

Understand how to work in teams and the diversity of teams, understanding how to consult whether it’s internal or external because you’re gonna have to do that. As part of your team understanding how people learn, cognition. And how instruction fits that piece. Tailor your instructions for the team you are dealing with. . . . And then maybe there’s this other element that I haven’t even mentioned at all, but also understanding those cost–benefit trade offs. This is really critical. There’s a lot to develop and integrate. What is the most cost-effective trade off?

(Director of Instruction and Training Systems)

Recommendation 4: Acquire and maintain knowledge of HPE trends and issues.

To advance HPE, IDs must become familiar with HPE trends, issues, innovations, and best practices and constantly update such knowledge

through regular scholarly and professional development activities. IDs are not expected to be SMEs in the clinical care of patients or in the underlying mechanisms of disease. However, to create relevant learning activities and fit them into the larger context of curricula and important educational movements, IDs should have a broad understanding of educational trends facing educators across the health professions and develop expertise in the specific areas of practice that are being addressed by stakeholders in their specific context.

To establish credibility, IDs should also stay informed about the trends and issues that confront healthcare practice, whether that is an ongoing pandemic or a change in the way these professionals are credentialed and certified. By understanding the competing pressures for time, resources, and incentives, IDs can help facilitate collaboration with HP educators and healthcare practitioners and properly prioritize projects and tasks for design team members.

Changes in compensation, illness prevention, epidemiology, accreditation, credentialing, and certification, as well as global health trends and changes in health economics, all influence HP curricula which require an evolving response by designers and educators. To stay current, IDs should read relevant research and literature published in journals listed in Table 23.3 and take advantage of institutional opportunities for continuing education, such as attending international and regional conferences, journal clubs, webinars/seminars, and workshops. Table 23.2 lists some current trends and issues in HPE derived from the interviews, publications, and HPE conference agendas.

TABLE 23.2 Trends and Issues Highlighted in HPE Journals and Conferences

Domains	Trends and Issues
Diversity, equity, inclusion, and accessibility	Global health; diversity, equity, and inclusion; cultural humility; universal and accessible design; equity and justice in education, including assessment; competency-based education; free online education; professional wellness; patient involvement
Technology in healthcare	Telehealth; home and mobile monitoring; clinical decision support software; AI in diagnostics, decision making, and documentation; electronic health records
Technology in HPE	AI, machine learning, and language processing in content generation, coaching, and assessment; virtual and mixed reality simulation models; programmatic and portfolio-based assessment
Health systems science education	Systems thinking in healthcare; delivery systems, structures, and processes; value in healthcare; safety and quality improvement; leadership; clinical informatics; structural and social determinants of health; health law, ethics, policy, and economics
Evidence-based education	Evidence from diverse sources and voices, counting knowledge gained from the Global South; rigorous methodology for primary studies and reviews; including learner experiences

Recommendation 5: Facilitate purposeful integration of emerging technologies.

Knowledge of emerging technologies and the skills necessary to utilize them to enhance learning and performance is not exclusive to HPE. The use of productivity, communication, multimedia development, and course authoring tools are not detailed here because they are essential for most IDs. Emerging educational technologies specific to HPE include clinical decision-making tools (e.g., Access Medicine, Clinical Key, DynaMed, Epocrates, MedOne, UptoDate, WebMD); commercial third-party learning platforms for content and practice questions (e.g., AMBOSS, Anki, Aquifer, Boards & Beyond, Lecturio, Pathoma, UWorld, Sketchy, ScholarRX); healthcare simulations and virtual, mixed, and augmented reality, (e.g., standardized and virtual patient simulations, manikins, part-task trainers, Anatomage™ tables); learner assessment applications (e.g., Exemplify, Examsoft); and tools for case-based pedagogy, as per Jin and Bridges (2014) (i.e., learning software and digital learning objects, interactive whiteboards, plasma screens, and LMS).

Although the use of “technology” is mentioned explicitly as an ID competency, specific hardware and software applications are not often referenced because they are subject to frequent change. The emergence of artificial intelligence, machine learning, and related chatbots provides a good example. Instead, the ATD and IBSTPI frameworks note basic functions, such as for creating learning systems, multimedia production, planning and analysis, and reference skills and dispositions necessary to remain abreast of emerging tools, such as digital and information literacy. Grimwood and Snell’s (2020) review of the literature on the use of technology in healthcare education also provides further insights. In summary, they found four key themes related to the use of technology: (a) the types of technologies used in healthcare education, (b) the integration of technology into the healthcare curriculum, (c) the skills and knowledge of the healthcare educators, and (d) the benefits of using technology for the learners. We also underscore the importance of formulating explicit strategies for integrating the use of technology. As evidenced by Hirumi et al. (2016) and noted in Issenberg et al.’s (2005) review of VP simulations, effective curriculum integration is one of the top three factors associated with positive learning outcomes.

To integrate technologies that facilitate the achievement of desired learning outcomes, IDs need to work closely with content experts to understand the intended learning outcomes, and then co-design interventions that use technology to enhance teaching and learning. In addition, technology-related consultations provide opportunities for addressing fundamental questions about how and why selected technologies aid in achieving the fundamental design and learning goals at hand. Keeping educators informed of emerging technology trends is seen as a valued part of the IDs’ responsibility across HPE.

Recommendation 6: Formulate solutions that go beyond pedagogy to maximize impact.

Many factors outside the design of learning activities can affect faculty and student performance. The ability to conduct a thorough needs assessment is crucial for formulating solutions that may consist of more than a pedagogical intervention. Analyzing and determining the cause(s) of

performance problems and discerning when different types of training and non-training interventions are warranted require skills that IDs can bring to HPE.

Because educators and IDs work within a system, changing one aspect of an educational system may necessitate adjustments to other aspects of the system (e.g., logistics, resource and personnel allocation, professional development, program evaluation) to maintain and institutionalize prescribed changes over time (Hirumi et al., 2021). IDs who view their role in HPE as a performance technologist, leveraging knowledge of and prescribing both training and non-training interventions based on data rather than fads and opinions, bring added value to an organization by addressing factors and proposing solutions that go beyond teaching and learning.

I expect from the instructional designers to know the state of the art. In terms of the tools and the possibilities, because the stuff might already be out there and I just don't know it and I don't want to reinvent it. I expect them to know the best way to do the learning activities, technology wise. And then I think the big one, which is really challenging, is making any curricular product or learning activity cohesive and integrated with the bigger culture or curriculum.

(Associate Professor of Medical Education)

Recommendation 7: Facilitate research and contribute to evidence-based education and freely available resources.

Competencies associated with planning, conducting, and disseminating the results of research are vital for IDs to advance HPE. These functions are critical to rich and ongoing collaborations for IDs, especially those with advanced degrees or with aspirations for getting promoted in academic HPE settings.

Double-blind studies with randomly assigned subjects to treatment and control groups remain the gold standard for biomedical research. As such, many HP educators may need guidance on alternative qualitative and applied research methods, such as design-based research (Hoadley & Campos, 2022), action research (Casey et al., 2021; Stringer & Genat, 2004), and improvement science (Portela et al., 2016). IDs should also be prepared to help educators acquire, appraise, and apply educational evidence in a way that considers the local context. In addition, IDs seeking to find evidence to inform their designs should consider searching databases that index HPE research and literature, including EMBASE, ERIC, MEDLINE (PubMed), Ovid, PsycInfo, Web of Science, Open Grey, and ProQuest Dissertations & Theses Global, and review journals listed in Table 23.3.

Metzendorf et al. (2014) compared two sources of healthcare publications: PubMed and The Cochrane Library (with 800,000 references). Both offer sophisticated instruments for searching the vast number of biomedical publications that vary in scope. PubMed is a source of primary literature indexed from academic journals. In contrast, the Cochrane Library offers access to synthesized publication types such as reviews or meta-analyses. Both sources are for biomedical studies but also for HPE research.

To advance HPE, IDs should be involved in disseminating effective and successful educational content and interventions, such as case studies, teaching reports, and learning sources that others can adapt to their own contexts and cultures. Making educational content or design freely available and inclusive is the focus of much attention. Conversely, IDs should be able to source existing education products and adapt them to their local context by utilizing resources such as the MedEDPORTAL, as discussed under Recommendation 2.

The ability to contribute to the HPE evidence base by conducting research and disseminating research results in professional journals and conferences is highly valued, particularly by those seeking promotion and tenure in research-oriented universities. Research may include descriptive, associational, interventional, bibliometric study designs or may involve creating a systematic review, meta-analysis, or narrative review. IDs may also be involved in securing funding for research and development and would collaborate with librarians and funding experts to investigate grant funding sources aimed at educational or clinical research at their institution. To contribute to the HPE knowledge base, IDs should review guidelines published by the journals listed in Table 23.3 as well as those posted by professional organizations listed in Recommendation 4. IDs may also add value by informing HP educators of opportunities to publish in ID- and education-related journals that they may not be familiar with if the targeted journals are indexed by PubMed; a vital criterion for recognizing publications for promotion and tenure in HPE.

TABLE 23.3 List of Professional Journals that Publish Research and Literature on HPE

Academic Medicine	Journal of Biomedical Education
Advances in Health Sciences Education	Journal of Continuing Education in the Health Professions
Advances in Medical Education and Practice	Journal of Graduate Medical Education
American Journal of Pharmaceutical Education	Journal of Interprofessional Education and Practice
BMC Medical Education	Journal of Medical Education and Curricular Development
Canadian Medical Education Journal	Journal of Medical Education and Training
Cureus	Medical Science Educator
Currents in Pharmacy Teaching and Learning	Medical Teacher
Focus on Health Professional Education	Nurse Education in Practice
Frontiers in Medicine	Nurse Education Today
Innovations in Health Sciences Education Journal	Teaching and Learning in Medicine
International Journal of Medical Science and Education	World Journal of Medical Education

CONCLUSION

This chapter provides a snapshot of the status of ID in HPE and recommends key competencies to inform IDs seeking a career and educators considering collaboration with IDs in HPE. Findings from our survey, interviews, and analysis of job announcements support existing research and literature on key ID competencies in general, and in HPE specifically. It is also evident that IDs can facilitate learning in different ways. By developing basic ID competencies and acquiring SKDs specific to HPE, IDs can help HP educators realize the potential of learning sciences, technology, and research to advance HPE.

Summary of Key Principles

1. **Follow fundamental ID principles and practices to align instructional elements.** IDs should follow a systematic process to align the basic elements of instruction and align the elements with personal and professional goals and with research, theory, and practice to ensure high-quality learning experiences.
2. **Use project and change management to navigate complexities in HPE contexts and cultures.** The roles and responsibilities assigned to IDs vary by context. IDs should understand the needs of stakeholders and undertake change processes to fully participate in optimizing instruction.
3. **Foster collaboration, interpersonal communications, and transdisciplinary teamwork.** IDs should work in and lead teams who collaborate openly across disciplines to develop a cohesive curriculum and achieve expected outcomes.
4. **Acquire and maintain knowledge of HPE trends and issues.** To gain credibility and facilitate collaboration, IDs should rapidly acquire a keen understanding of the trends and issues that face healthcare professionals and educators across the disciplines.
5. **Facilitate purposeful integration of emerging technologies.** IDs should utilize their expertise in the integration of emerging learning technologies to catalyze collaboration and the adoption of ID principles and practices.
6. **Formulate solutions that go beyond pedagogy to maximize impact.** IDs must know how to assess needs, identify and prioritize causes of performance failures, and determine when to prescribe training or non-training interventions to improve job performance.
7. **Facilitate research and contribute to evidence-based education and freely available resources.** IDs should help educators reach professional goals, gain trust, and promote collaboration along the way by conducting and disseminating research and sharing instructional products.

Application Questions

1. ID at a Pharmacy School (Case Study 1) – Students are performing the following expectations. What should you do?

Several months prior to the course’s scheduled start date, the lead instructor and content expert of a pharmacy course in applied chemistry asks you (as an instructional consultant) to look at the course content and the instructional design. The problem is that students consistently score below expectations on mid-term and final course exams compared to other courses. What should you do?

- a. During the initial consultation, what questions should you ask the content expert?
- b. After your initial consultation, what steps should you take with the content expert? Who else should you contact, and what questions should you ask?
- c. What extant and original data should you gather and why?

2. ID at a Medical School (Case Study 2) – Online and hybrid learning: What should you do after initial design and development?

When COVID-19 hit, K–12 schools and universities scrambled to offer coursework online to meet the educational needs of students worldwide. The medical school at a large university in Australia was also in the process of redesigning its entire program. Initially, the transformation from conventional in-person coursework to fully online delivery was considered a new build, rather than a rework of the entire program. A small team of two full-timers and one part-timer began the design process, which took the first six months to ramp things up. By the beginning of Year 2, the first year the new program was being piloted, new people were hired, and the project team grew to eight full-timers, one media expert, and seven learning specialists. Now at the end of Year 2 of the project, the

team has completed designing and begun piloting the second year of the new program and wants to take some time to review what they learned to plan and inform Year 3 of program development. They are happy that they got Year 1 and Year 2 of the curriculum up and running but feel that the new program is not necessarily incorporating new and innovative instructional strategies. In other words, most of the time and resources were spent during Year 1 and Year 2 organizing and digitizing coursework for online delivery, but relatively little time was spent creating new and engaging ways to facilitate learning. Before the team begins Year 3 of the project, what should they do?

- a. During the initial consultation, what questions should you ask the content expert?
- b. After your initial consultation, what steps should you take with the content expert? Who else should you contact, and what questions should you ask?
- c. What extant and original data should you gather and why?

3. ID at a Health Science Center (Case Study 3) – Design a portfolio assessment system for an entire health science center – Where should you begin?

A faculty member in charge of accreditation at a health science center in Eastern Europe approaches you. She works with faculty, staff, students, and administrators across four major schools associated with the center, including nursing, medicine, pharmacy, and global health. She attended one of your workshops on curriculum development and program evaluation at a recent health science education conference and

asks for your help. She begins with fantastic news – all four schools were recently accredited by related international accrediting agencies. However, to maintain their accreditation, they must now design and implement a portfolio assessment system to facilitate and measure the achievement of new program competencies that are being drafted and implemented within each school. The system does not have to be fully operational across all four schools immediately; rather, some aspects of the system must be functional by the beginning of the next school term (six months away). The faculty member asks you to prepare a proposal outlining what you will do and produce over the next year to meet accreditation requirements to design and begin implementing a center-wide portfolio assessment system.

- a. What should you do before drafting the proposal?
- b. What key tasks and milestones should be included in the proposal?
- c. Who should be involved, and what should their roles and responsibilities be during Year 1 of the project and beyond?

4. Other application questions (Tech Integration)

You have just been hired as an instructional designer in a school of nursing. With your high-tech background and interests, you have been tasked to work with faculty within the school as well as collaborating with schools of medicine, pharmacy, and therapy to integrate the use of emerging technology to create and facilitate a series of new inter-professional learning experiences. What should you do to begin and facilitate the design process? (Hint: There is a national group promoting Interprofessional Education – www.ipecollaborative.org.)

5. Other application questions (Evidence-Based Design)

You are a learning specialist in a school of medicine. Faculty in your school just attended a workshop on evidence-based medical education. They turn to you and want to know why they should take the time to search for, acquire, appraise, and apply educational evidence.

- a. How would you respond to the question?
- b. What would you do to facilitate evidence-based educational practices?

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Integrating Technology Into K-12 Education

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According to the 2017 U.S. National Education Technology Plan, “Technology is integral to most learning designs, used daily within and beyond the classroom for collaboration, inquiry, and composition, as well as for connecting with others around the world” (U.S. Department of Education, p. 45). The plan also emphasizes the potential of technology to transform learning experiences and assessments in more comprehensive, authentic, and meaningful ways.

Over the years, both teachers and students in K–12 schools have had increasing access to technology resources. The long-term impact of the COVID-19 pandemic has accelerated the shift toward more technology-based instruction and set a new standard for technology integration in K–12 classrooms. Around 94% of adults with school-aged children (under 18) at home have reported that their kids always or usually have access to computers and the Internet for educational purposes (Hemphill et al., 2021). Notably, in a Project Tomorrow (2023a) report, there has been a significant increase in the number of classroom teachers who feel very comfortable using student devices in their lessons and classroom activities, from 22% in 2018 to 50% in 2022. The most frequently used technology resources by teachers on a weekly basis were online curriculum (70%), online videos (63%), and software and apps for skill development (53%).

Given the increased availability and use of technology in K–12 settings and the increasing importance of technology in the everyday lives of most individuals, it is important to consider the most effective methods for integrating these tools and resources into instruction, with a particular focus on the tools and methods that support student learning and engagement. Thus, this chapter will focus on:

1. Models and strategies that detail how to support instruction with technology
2. Current technology resources in K–12 settings
3. An overview of the issues associated with technology integration

SUPPORTING INSTRUCTION WITH TECHNOLOGY: CURRENT MODELS AND STRATEGIES

Models of Technology Integration

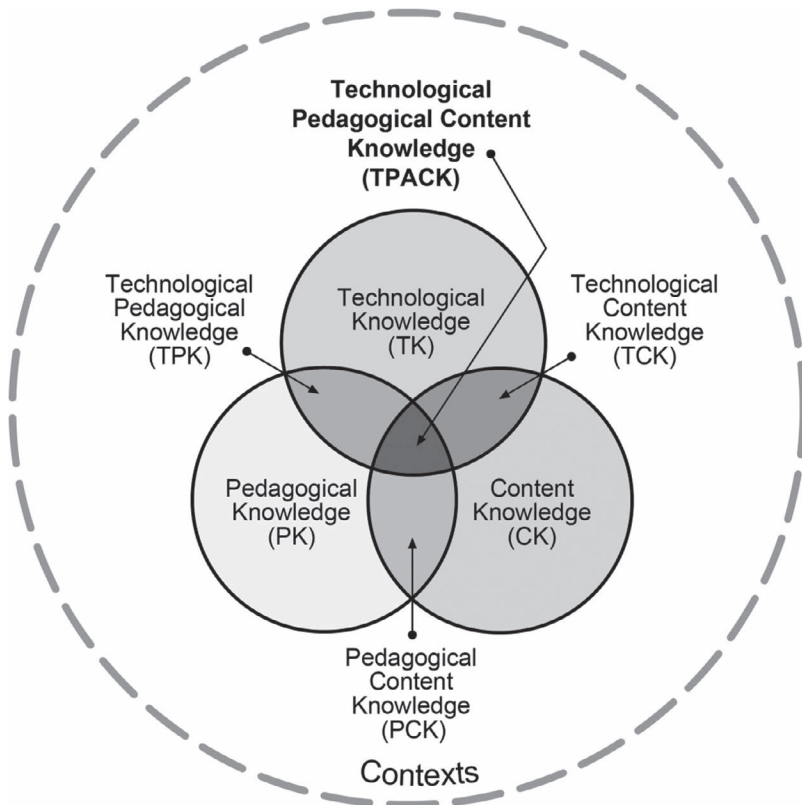
There are several well-described models focusing on effective methods for integrating technology into instruction to support teaching and learning. The two most prevalent models in the literature are the SAMR model and the TPACK model. Both focus mainly on the teacher – that is, areas a teacher should consider in order to effectively integrate technology to support instruction.

The SAMR model (Substitution, Augmentation, Modification, Redefinition), developed by Puentedura (Romrell et al., 2014), defines a progressive model in which each level represents a more effective means for integrating technology into instruction. At the *substitution* level, technology functions as a direct tool substitute without changing the pedagogical approach. For example, the teacher could use the computer to create a printable worksheet that students would complete and hand in. At the *augmentation* level, technology is used as a direct tool substitute, but there is functional improvement. At this level, teachers could have students use a digital resource as opposed to a print-based resource – functional improvements would include students now having the ability to easily search for key terms. The *modification* level is where technology enables the teacher to significantly redesign a task. At this level, teachers may have students collaborate to create a book using an online publishing tool such as Google Docs. The highest level is *redefinition*, where the technology enables teachers to create new tasks that were previously inconceivable without technology. At this level, students could publish persuasive writing on public blogs and engage in online conferences with “live” experts on a particular topic/problem.

The technological pedagogical and content knowledge (TPACK) model is a framework for articulating and improving teachers’ use of technology for teaching and learning (Mishra & Koehler, 2006). Researchers and teacher educators have adopted TPACK as a tool for understanding and advancing preservice and in-service teachers’ ability to integrate technology into their instruction (e.g., Lai et al., 2022; Mouza et al., 2017; Voithofer & Nelson, 2021). TPACK is depicted as three overlapping circles of knowledge (technological, pedagogical, and content). These three circles overlap to create seven distinct constructs of knowledge situated in unique contexts (see Figure 24.1): content (CK), pedagogical (PK), technological (TK), technological pedagogical (TPK), technological content (TCK), pedagogical content (PCK), and technological pedagogical content (TPACK). In order to help teachers develop their TPACK and abilities to integrate technology, all seven distinct constructs should be assessed and action should be taken to address deficiencies.

It is suggested that if teachers have strong skills in all seven TPACK knowledge areas, they will be able to integrate technology into their instruction. In one example, more experienced teachers may have excellent PCK, but because their TK is weak, they would have difficulty with TPACK and, therefore, technology integration. In this case, professional development should focus on developing teachers’ technology skills, such as knowing the features and affordances of technologies and being able to identify the applicability and appropriateness of technologies to support their lessons. Although the

FIGURE 24.1 The TPACK Framework image



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TPACK model is strong conceptually and widely implemented (Kessler & Phillips, 2019; Mishra, 2019), some researchers question the validity of the model (Brantley-Dias & Ertmer, 2013; Kopcha et al., 2014; Saubern et al., 2020; Scherer et al., 2017).

Technology Standards for Teachers and Students

In K–12 education, common standards for students are important in order to delineate a baseline by which to assess student progress toward meeting developmental goals. In the field of educational technology, the most recent International Society for Technology in Education (ISTE) Standards for Students (2016) has provided seven overarching standards that students should achieve in order to be technology literate: (1) empowered learner, (2) digital citizen, (3) knowledge constructor, (4) innovative designer, (5) computational thinker, (6) creative communicator, and (7) global collaborator.

ISTE (2016) also put forth ISTE Standards for Educators, which outlines seven indicators for teachers to deepen their technology integration practices as being a (1) learner, (2) leader, (3) citizen, (4) collaborator, (5) designer,

(6) facilitator, and (7) analyst. Given the ever-growing attention and demand for computing education in K–12 schools, ISTE (2019) has introduced Computational Thinking Competencies. These competencies include five indicators to guide teachers' computational thinking integration across all disciplines to empower students in innovation and problem-solving: (1) computational thinking, (2) equity leader, (3) collaborating around computing, (4) creativity and design, and (5) integrating computational thinking.

ENHANCING INSTRUCTION WITH TECHNOLOGY

There are numerous enhancements to current instructional practices that have been proposed for K–12 settings. Suggestions for these instructional enhancements are heavily reliant on technology and include fostering more inquiry-based learning that can be enhanced through the use of hands-on activities and problem-solving, supporting personalized learning through data-driven decision making and artificial intelligence-powered tools, engaging students in content via alternative strategies, such as games; using online and blended learning strategies, such as flipped learning; and providing “maker movement” design spaces that enable students to use digital technologies to create a variety of products. These instructional enhancements can be interrelated and applied individually or in combination to create a more innovative and transformative learning environment for K–12 students.

Supporting Inquiry-Based Learning

One area that is increasingly discussed focuses on inquiry-based learning methods, including project-based and problem-based learning (Brush & Saye, 2014; Grant & Tamim, 2019). With both of these models, instructional activities are centered around an engaging, authentic problem. Students are provided resources and scaffolding in order to assist them with developing and defending a solution to the problem. With these models, technology can be used to support the inquiry process. For example, Liu et al. (2019) integrated a 3D immersive multimedia environment, which integrated texts, graphics, videos, and 3D models, to teach space science to sixth-grade students. They found that both students' science knowledge and attitude toward science had increased. The students also reported that they felt more confident in collaborating with others and solving problems. Results also indicated that the immersive multimedia environment provided them the freedom and autonomy to learn about the solar system.

Tawfik et al. (2021) interviewed a group of experienced K–12 teachers who had implemented problem-based learning for several years. The study aimed to explore the teachers' adaptations to this instructional approach. The researchers found that the teachers used technology to create avenues for constructing knowledge through iterative inquiry and effectively supported student collaboration, information-seeking, and resource sharing. The teachers shared that K–12 students' increasing digital literacy had expanded opportunities and accessibilities to problem-based learning through technology. However, they acknowledged the need to address potential issues such as information overload for students and classroom management with technology usage in problem-based learning.

Supporting Personalized Learning

Personalized learning focuses on utilizing different instructional strategies and approaches to support individual, self-directed learning goals (Grant & Basye, 2014) and to meet the needs of each learner (U.S. Department of Education, 2017). Some of the common approaches to personalized learning include engaging students in blended learning environments, using adaptive learning software to guide students through an individualized program with immediate formative assessment (Johnson et al., 2014), integrating competency-based models of instruction for students (Tanenbaum et al., 2013), and using data-driven decision making to improve instruction (Buzhardt et al., 2020).

BLENDED AND FLIPPED LEARNING Blended and flipped learning has become increasingly popular in K–12 education since the onset of the COVID-19 pandemic. Blended learning is a hybrid instructional approach with a mix of face-to-face lessons and online study. Flipped learning is defined by Flipped Learning Network (2014) as:

A pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter.

Such approaches typically involve having students use their own strategies to learn and progress through learning goals at their own pace and demonstrate their knowledge in unique ways. Blended and flipped learning has been shown to be more effective in student engagement and performance than the traditional lecture-driven instructional delivery model (Florence & Kolski, 2021).

DATA-DRIVEN DECISION MAKING Effective technology integration should support learning objectives and instruction based on students' needs and interests (NETP, 2017). In K–12 schools, lessons need to be reviewed and revised continuously based on the results of student assessments to ensure the effectiveness of instruction. Using data-driven decision making, teachers can use technology to help collect and analyze assessment data to identify areas where individual students need support and inform their instructional decisions. For instance, Lee et al. (2021) proposed a technology system for personalized learning with four major functions: (1) recordkeeping, (2) planning, (3) instruction, and (4) assessment.

Game-Based Learning

As one of the more popular trends, many are touting the importance of digital games in education. According to a recent Speak Up 2022 report, 51% of K–12 teachers surveyed indicated that they utilized online games in their classrooms on a weekly basis, with 45% identifying digital games as the best technologies to help enhance student outcomes (Project Tomorrow, 2023a). Teachers often define digital games as both drill-and-practice activities with rewards and more sophisticated educational games that have rules and mimic

mainstream games. Digital game-based learning supports students' creative and critical approaches to complex problems and encourages engagement and participation (Crompton et al., 2018).

Game-based learning instructional approaches support not only *learning through play* but also *learning through creation*. Many benefits stem from students designing and creating digital games, such as increasing digital and computational literacies and problem-solving skills. Digital game creation may involve multiple activities in practice. For instance, students build interactive narratives in an English Language Arts classroom. Then, they build their games using introductory programming language or user-friendly programming tools such as Scratch and Twine (Aranas et al., 2021).

Maker Movement

The concept of “making” is defined as a set of activities centered around designing, building, modifying, or repurposing material objects. The goal is to create a “product” that can be used, interacted with, or demonstrated (Martin, 2015, p. 31). This process enables students to construct various products and artifacts such as electronic jewelry, video games, cybernetic creatures, interactive e-textiles, programmed robots, and multimodal compositions. The educational benefits of the maker movement have been recognized by K–12 schools, leading to the integration of makerspaces into instruction (Khadri Ahmed, 2023; Schad & Jones, 2020). Peppler (2013) suggests that this type of “interest-driven arts learning” requires four practices of production: technical (coding, debugging, repurposing), critical (observing and deconstructing media, evaluating and reflecting, referencing, reworking, and remixing), creative (making artistic choices, connecting multimodal sign systems), and ethical (crediting ownership, providing inside information, respectful collaboration and sharing). A study by Iwata et al. (2020) revealed that maker education supports the development of middle school students' 21st-century skills and computational thinking through the creation of tangible artifacts using digital fabrication resources. Specifically, digital fabrication activities were found to enhance students' creativity and skills in collaboration, decision making, critical thinking, and problem solving. The study emphasized the crucial role of teachers' facilitation and scaffolding throughout the making process in influencing students' learning outcomes in makerspaces.

Artificial Intelligence in K–12 Education

The presence of artificial intelligence (AI) has rapidly increased in our daily lives and is gradually transforming the landscape of K–12 education. However, since using AI in education is a relatively new concept in the vision of educational technology, some educators may be hesitant about how it can effectively support teaching and learning. This is due to a lack of understanding and familiarity with the potential benefits and applications of AI in education (Crompton et al., 2022; Zafari et al., 2022). Based on research in this area, Crompton et al. (2022) categorized AI being applied in K–12 in three domains: (1) pedagogy (e.g., gaming, personalized learning, modeling, visualization, collaboration), (2) administration (e.g., assessment, prediction, diagnosis), and (3) subject content (e.g., writing instructor, language skills). The findings from

studies in these areas show that AI can provide support in instruction and extend and enhance students' learning opportunities and outcomes in schools. To better facilitate AI education and instruction in K–12 settings, the Artificial Intelligence for K-12 Initiative (2021) proposed national guidelines and curated resources for the five big ideas in AI that all students should learn: (1) perception, (2) representation and reasoning, (3) learning, (4) natural interaction, and (5) societal impact.

The Power School 2023 Education Focus Report revealed that education leaders feel AI holds the most promise to support personalized learning and improve the future of education. In the report, a vice president shared the potential of using AI to provide more equitable support in K–12 schools: “[AI] can be a great leveler – helping students remediate quickly. . . . Now students can interact with AI to learn how to write a basic essay or learn a math skill, and teachers can focus on higher level concepts and learning progression” (p. 3). Although AI has great potential in K–12 education, it is important to address ethical concerns such as gender and racial bias, as well as student data privacy issues (Akgun & Greenhow, 2021; Crompton et al., 2022). These challenges must be carefully examined and dealt with to ensure a safe, equitable, and enhanced learning experience for students.

CURRENT TECHNOLOGY RESOURCES IN K–12 SETTINGS

The integration of technology in education has seen a significant surge in recent years, with an array of new tools and resources becoming more accessible to schools and students. As technology becomes more prevalent, scholars have continuously advocated for their use in fostering student-centered, active learning approaches to enhance students' learning experiences and outcomes (Project Tomorrow, 2023a; Shehata et al., 2023). This section will explore several types of emerging technology-based tools and resources that hold promise in supporting more student-centered, active learning approaches.

Mobile Technologies

The educational affordances of mobile technologies include the ability to deliver content at any place at any time (Park, 2011), the opportunity for immediate learning assistance and feedback (Reeves et al., 2017), and the accessibility to information and resources regardless of time or location (Dlamini & Nkambule, 2020). These affordances have opened up the capacity to have students document and create artifacts based on their learning. Researchers also found that learning environments involving the use of mobile technologies support learner agency and autonomy in K–12 (Pellerin, 2018).

The most recent Speak Up Research results show that 91% of K–12 teachers now have students with access to a personally assigned digital learning device. This number has tripled since 2014 (Project Tomorrow, 2023a). With the increase in student ownership of mobile devices (cell phones, tablets, and wearables), mobile learning is quickly becoming easier and more feasible for K–12 education. In the same report, 50% of the surveyed teachers indicated that they are very comfortable leveraging mobile technologies (tablets, laptops, and Chromebooks) with their instruction, which has significantly increased from 22% since 2018. The increase in popularity and accessibility of

mobile technologies has made the role of teachers more critical. They are now tasked with selecting and making decisions on mobile devices and resources, understanding the affordances of the technologies to plan their instruction, and providing necessary support on the device during instruction (Grant et al., 2015). This shift has been influenced by the teaching advantages that mobile technologies offer, and their ability to engage students' interest and enhance learning experiences.

Several instances demonstrate the effective use of mobile technologies to enhance student engagement and learning outcomes. For example, Chen and Liu (2020) employed an augmented reality app, "Elements 4D," in a blend of teacher-led demonstrations and student-focused hands-on activities to facilitate students' comprehension of chemistry concepts. This app allowed ninth-grade students to engage with simulations of chemical elements and reactions. The findings revealed that integrating the mobile app with hands-on learning activities significantly boosted students' performance and reinforced their long-term understanding of chemical elements.

Additional applications of mobile technologies in K–12 education encompass the use of mobile devices equipped with camera and annotation functions. These tools enable students to identify and document angles, perimeters, and symmetry relative to other objects, thereby enhancing their understanding of geometry (Fabian & Topping, 2019). Mobile technologies also support microlearning for language practice and vocabulary acquisition in short time frames without spatial constraints (Epp & Phirangee, 2019). Furthermore, apps and digital books have been used to bolster young students' comprehension as well as their reading and writing development (Eutsler et al., 2020). These examples underscore the potential of mobile technologies to be effectively integrated into K–12 education. However, it is important to note that they can also be viewed as distractions in the classroom (Nikolopoulou, 2020). Therefore, teachers need to be mindful of how they integrate mobile technologies and leverage them in their instruction.

Web 2.0 Tools and Cloud Applications

As technology uses have become prevalent in K–12 education in recent years, Web 2.0 and cloud-based tools and resources have also been ubiquitously used by teachers in technology-enriched classrooms. Web 2.0, an evolution from the original, static Internet, has transformed into an era of increased user engagement, with individuals actively posting comments, uploading content, and interacting with other users (Ziegler, 2022). Examples of Web 2.0 tools that exemplify these collaborative characteristics include media sharing sites (YouTube, TeacherTube, Flipgrid), social networking sites (Facebook, LinkedIn, Instagram), blogging and microblogging sites (Blogger, Edublog, X [formerly Twitter]), content creation tools (Adobe Express, Vimeo, Pixler), presentation tools (Google Slides, Prezi, Thinglink), and collaborative knowledge development wikis (PBWorks, Wikidot). The simplicity of these tools has made them accessible to basic users, including students who are using them for both personal and learning purposes (Hew & Cheung, 2013). In K–12 environments, teachers and students are increasingly leveraging these tools to enhance learning experiences (Project Tomorrow, 2023a). The positive impact of Web 2.0

tools on student learning is more significantly influenced by the manner in which these technologies are utilized, rather than the inherent features of the tools themselves. For instance, using blogs for peer review or self-reflection, or using a podcast to review information, can increase student achievement. However, this increased achievement may be more related to the instructional strategy used (i.e., peer feedback and review) than the use of the tools (blog and podcast). The Web 2.0 tools simply make it easier and more efficient to implement these strategies.

In addition to Web 2.0 tools, cloud-based tools and applications have also emerged as powerful resources for technology integration and have played a significant role in advancing technology use within K–12 education. As Internet connectivity has significantly improved over the years, more cloud-based applications that require robust connectivity in the school infrastructure have become more prevalent. These applications not only provide a platform for sustainable procedures to protect schools' digital assets but also offer a foundation for enhancing student learning experiences (Project Tomorrow, 2023b). In the 2021 Speak Up research survey, 87% of school principals reported that their schools have implemented cloud-based tools and resources to support K–12 students' communication and collaboration (Project Tomorrow, 2023b). The affordances of cloud-based applications in teaching and learning are flexibility, accessibility, and simplicity (Bonderud, 2021). Some common types of cloud-based applications adopted by school districts include storage platforms (Google Drive, Microsoft Azure), learning management systems (Google Classroom, Moodle), and content delivery mechanisms (Coursera, Knowledge Matters, TED-Ed).

From an instructional standpoint, it is crucial to first focus on the most effective instructional strategy for meeting learning goals and then examine the Web 2.0 tools and cloud applications available that can facilitate the implementation of that strategy. While the specific tools may evolve over time, the underlying principles of collaboration, interactivity, and user-generated content that characterize Web 2.0 and cloud-based applications continue to offer valuable opportunities for enhancing teaching and learning in K–12 education.

Open Educational Resources

The use of open educational resources (OER) and open content has become increasingly popular in K–12 education. OERs are teaching and learning materials that exist in the public domain or have been uploaded with a special copyright license allowing others to use and edit them. OERs can include a wide range of educational materials, from full courses to singular learning objects such as videos or images. Teachers and educational stakeholders advocate that OERs save schools money due to the saved time and resources required to develop new educational materials (Brandle et al., 2019). In addition to saving money, time, and resources, studies have shown that students using OERs have similar learning gains to those using traditional materials (Hilton et al., 2019; Robinson et al., 2014). Thus, OERs provide the flexibility for teachers to differentiate and personalize learning content based on student needs (Van Allen & Katz, 2020).

Creative Commons (2015) is a nonprofit organization dedicated to assisting owners of creative works to legally share and distribute their

TABLE 24.1 Open Educational Resources for K–12 Education

Curriki	www.curriki.org
OER Commons	www.oercommons.org
EDSITEment	http://edsitement.neh.gov
EdTech Books	https://edtechbooks.org
CK-12 Foundation	www.ck12.org
K-12 OER Collaborative	https://education-reimagined.org/resources/oer-collaborative
Wide Open Schools	www.common sense media.org/wide-open-school
Saylor	www.saylor.org
HippoCampus	www.hippocampus.org
ShareMyLesson	www.sharemylesson.com
WatchKnowLearn	www.watchknowlearn.org
MIT Open Courseware	https://mitocw.zendesk.com/hc/en-us

materials. This particular license grants others the ability to exercise what is often referred to as the “5Rs” – to retain, reuse, revise, remix, and redistribute teaching and learning materials (Wiley & Hilton, 2018). As of 2023, the growing commons of Creative Commons licensed resources has reached 2 billion works, spanning from literary works to videos, photos, open education, scientific research, and more (Creative Commons, 2023). Teachers and educators around the world contribute to OER databases that exist on a number of different websites (see Table 24.1).

Virtual and Augmented Reality

Virtual reality (VR) creates a complete immersion for a user “in a synthetic world without seeing the real world” (Carmigniani et al., 2011, p. 342). Augmented reality (AR) technology “allows for combining or supplementing real-world objects with virtual objects or superimposed information” (Bacca Acosta, 2014, p. 133) so that digital information such as sounds, videos, and graphics are overlaid on top of the real-world environment. The use of emerging technologies, such as VR and AR, has transformed the vision of K–12 education and improved student learning. These technologies have the potential to enhance student engagement and motivation, increase creativity and retention of knowledge, and support collaboration and communication (Maas & Hughes, 2020). Moreover, integrating VR and AR also opens up the accessibility and opportunities for learning without the constraints of space and time (Dick, 2021).

The immersive learning environment in VR also creates a space where students can imitate real-world situations, such as communication and interactions, using their senses and emotions and making students more attentive and motivated to learn (Lau & Lee, 2015). Some instructional resources, such as Google Expeditions, Google Arts and Culture, and the Merge Cube, can facilitate inquiry-based instruction that also allows additional pedagogical strategies for personalized and differentiated learning (Cowin, 2020; Tilhou

et al., 2020). The use of these instructional strategies in the simulation environment facilitates students' complex problem-solving, critical thinking, and digital literacy skills.

Examples of AR and VR applications are commonly found in language and STEM education. For instance, the Second Life virtual environment supports language acquisition where students are able to learn, listen, and orally practice the vocabulary of the target language (Park, 2018; Lan et al., 2018) and develop storytelling skills (Liang, 2018). Additionally, Cheng and Tsai (2016) used an interactive AR picture book to support children's reading comprehension. Other scholars also found that mixed reality, a real-world experience with features and elements of AR and VR integrated into a physical environment, has been successfully integrated into K–12 classrooms to increase students' learning (Pellas et al., 2020). Through Common Sense Education (www.commonsense.org/education/lists/ar-and-vr-games-and-apps-for-learning), educators can find a list of AR and VR games and apps to be used across subject areas to support student learning.

Programming and Robotics

With the dramatic increase of attention and efforts in K–12 computing education across the country, researchers and educators have advocated the pressing need for all K–12 students' development of computational literacy, especially with an early-age exposure to computing (Code.org et al., 2022). To ensure all students are prepared with essential computational literacy and computing concepts in this digital age, many states have developed their state computer science standards corresponding to K-12 Computer Science Framework (2016) and CSTA K-12 Computer Science Standards (2017) and have made computer science education mandatory. Computational literacy can be taught without technology devices (e.g., CS Unplugged, www.csunplugged.org), but many have found that technology-supported learning activities provide variety and the possibility to enhance students' learning experience and engage them in the process of problem-solving and computational thinking.

There is a plethora of instructional resources to support K–12 students' development of computational literacy. At the elementary level, many schools have used an integrated computing approach to embed computing concepts and practices into existing curricula across subject areas (Webb et al., 2017). For instance, using coding apps (e.g., Kodable, Daisey the Dinosaur, and Scratch Jr.) on tablets allows young students to learn coding concepts and increase interest in programming activities through project creation (Pila et al., 2019). Many educators also use web-based platforms, such as Hour of Code (on the code.org website) and Scratch, for students to tinker with computing concepts and apply their programming concepts to solve problems (e.g., Patterson, 2016) or tell stories (Pektas & Sullivan, 2021) on those platforms. Learning with tangible robots (e.g., KIBO, BeeBot, Dash and Dot, and Sphero) has also been favored to support students' creativity and collaboration (Bers, 2019; Bers et al., 2022). Resources, such as CodeCombat and CodeMonkey, support a game-based learning approach for students to engage in an interactive environment to develop coding skills

TABLE 24.2 K–12 Computer Science Education Models, Frameworks, and Resources

K-12 Computer Science Framework	https://k12cs.org/
Expanding Computing Education Pathways	https://ecepalliance.org/resources/
CSforALL	www.csforall.org/about/
CSforALL curriculum directory	www.csforall.org/projects_and_programs/curriculum_directory
Computer Science Teacher Association	https://csteachers.org/
ISTE Computational Thinking Competencies	www.iste.org/standards/iste-standards-for-computational-thinking

and programming concepts. Additionally, the CSforALL curriculum directory has collected many K–12 CS framework-aligned curricula and categorized them based on computing concepts, subconcepts, and grade bands. With the guidance of the K–12 CS framework, many of these curricula and instructional activities (see Table 24.2) can be seamlessly integrated into the existing K–12 curriculum to support students’ content knowledge and computational literacies.

ISSUES ASSOCIATED WITH INTEGRATING TECHNOLOGY INTO K–12 SETTINGS

Barriers and Enablers

The landscape of K–12 technology integration has experienced a significant shift, moving from a focus on the availability and accessibility of technology resources to an emphasis on the levels and processes of integration, which have extensive implications for teaching and learning (Project Tomorrow, 2023a). This change has led to a more in-depth investigation into the fundamental processes involved in integrating technology and the quality and complexity of technology integration in current K–12 schools. In light of this, Kopcha et al. (2020) have suggested a need to look beyond the product of teachers’ decisions about technology and investigate the process of teachers’ decision making about integrating technology into their teaching practices. They identified three big ideas that captured how teachers decide to use technology in the literature and concluded that “technology integration is (1) value driven, (2) embedded in a dynamic system, and (3) a product of a teacher’s perception of what is possible” (p. 733).

Although there are many descriptions of how technology can be used to powerfully impact teaching and learning in this chapter, scholars have indicated that the level of technology use and the quality of technology-enhanced instruction could be improved (Polly et al., 2021). Many scholars (e.g., Hew & Brush, 2007; Inan & Lowther, 2010; Liu et al., 2017) have investigated this phenomenon

and purported that various factors are involved and often interconnected as barriers or enablers in teachers' technology integration in K–12 schools:

- Knowledge and skills (technology skills, technology-supported pedagogy skills, and technology-related classroom management skills)
- Attitudes and beliefs (teacher attitudes and beliefs toward technology)
- Resources and infrastructure (availability and access to technology tools and resources, time, technical support, professional development)
- Institution (leadership, school schedules, technology integration plan)
- Assessment (measuring student learning, high-stakes testing, perceived tension between using technology and traditional examinations)
- Subject culture (institutional practices and expectations surrounding a subject area)

Out of all these factors, teachers typically report that personal knowledge and beliefs about technology are the most influential factors affecting teacher adoption and use of technology. In order to integrate technology, teachers need to have general knowledge about technology (how to use both hardware and software), as well as how technology can be used to support teaching and/or learning. Moreover, teachers' beliefs also play a critical role with regard to teacher adoption and integration of technology. If teachers do not view technology as important and beneficial for student learning, they are less likely to implement it in their classrooms, regardless of mandates or resources (Ertmer et al., 2012; McCulloch et al., 2018).

In the post-pandemic world, stakeholders, including school leaders, teachers, parents, and students, have recognized the importance and affordances of technology. As school infrastructure and resources have increased, teachers need continuous professional development to keep their knowledge updated because technology is constantly updating and evolving. Professional development experiences provide the opportunity to support technology integration by overcoming barriers such as lack of teacher knowledge and skills. For example, professional development opportunities can be directly related to teachers' beliefs, asking teachers to integrate technology into an existing lesson (Mishra & Koehler, 2006). During professional development, teachers should be introduced to technology that is personalized and contextualized, directly relevant to their classroom (Liao et al., 2021). Because the teachers are comfortable with the pedagogical context, they develop knowledge around their own specific context, and it integrates well with their existing beliefs.

Digital Equity: Access, Diversity, and Inclusion

Since the advent of digital technology in education, stakeholders and researchers alike have voiced concerns about the digital divide and the impact on students that leads to digital inequity. The term digital divide refers to the disparities in educational experiences resulting from varying levels of students' technology exposure. The digital divide seems to be present within most developed nations, with the differences primarily being due to the socioeconomic status of students (Van Dijk, 2020). From a global perspective, there is a digital

divide and inequities exist between nations. There are significant disparities in access to technology and Internet connectivity among countries. The availability of technology for students is greatly dependent upon the wealth of the country (UNESCO, 2020).

According to a recent Speak Up report by Project Tomorrow (2021), digital inequity can be addressed through four key aspects: (1) ensuring equitable access to technology resources, (2) maintaining consistency in learning experiences and teacher quality, (3) creating safe and supportive learning environments for student success, and (4) promoting student agency and ownership in learning. Therefore, as technology has become more prevalent in K–12 schools, technology should be leveraged to help close the gap of the digital divide and provide students with a more equitable, diverse, and inclusive learning environment in K–12 schools.

Enabling Adoption

While many acknowledge the presence of the digital divide, some studies have shown that teachers who recognize the benefits and values of technology tend to overcome barriers such as limited resources and integrate technology in their teaching (e.g., Ertmer et al., 2012). However, other studies (e.g., Ottenbreit-Leftwich et al., 2018) have found that external barriers such as structures, policies, culture, and resources can be difficult to overcome, especially for beginning teachers, even if they possess strong enablers such as knowledge, values, and beliefs.

Many scholars have debated about which is the most effective and efficient way to facilitate large-scale technology adoption and integration in K–12 schools. Typically, technology innovations are introduced through top-down (administrator-driven) or bottom-up (teacher-driven) decision-making processes. Petko and colleagues (2015) examined four different types of decision-making and adoption processes of technology innovations: (1) complementary (top-down and bottom-up), (2) top-down, (3) bottom-up, and (4) optional (meaning teachers could decide whether or not to adopt). Petko et al. (2015) found that when schools used a combined top-down and bottom-up approach in which district initiatives were supported by both the administration and teachers, teachers and students reported using technology more in their classrooms. Entirely top-down was the next most successful model, followed by bottom-up.

CONCLUSION

Perhaps the most important consideration when deciding whether and how a particular technology might be employed in a particular classroom situation is to first think about whether the use of that technology will enhance teaching and learning. Sometimes, researchers and educators are quick to adopt new technologies without first focusing on how that technology may affect instructional practices and student learning. By keeping effective pedagogical practices and student learning as our focus, we can investigate the affordances of various technologies and determine how their use may support what we already know about effective pedagogy. When considering whether to use a new technology in an instructional situation, it is important to consider

whether the affordances of that particular technology can help support good pedagogical practices and thus increase the likelihood that learning will be enhanced.

Summary of Key Principles

1. **Understanding technology integration is not simple.** Many have tried to define successful technology integration and what that looks like. Although there are several models and standards, we suggest that this can vary as long as it is positively impacting K–12 teaching and/or learning.
2. **Curricular and instructional practices can be enhanced with technology.** Several of the emerging innovative practices being implemented in K–12 schools (inquiry-based learning, flipped learning, personalized learning) can be supported with the use of technology.
3. **New tools will constantly be introduced.** There seems to be a continuous stream of new technology tools and resources available to teachers. Before adopting a new tool, it's important to identify the educational affordances of that tool and how those affordances can be used to improve teaching and/or learning.
4. **Adoption of technology requires continuous systemic support.** To enable successful technology adoption, districts need to understand all the barriers and enablers likely to affect technology integration.
5. **Teachers are the greatest asset for equitable technology integration.** If teachers believe technology is important and have the necessary support, technology will more likely be used in equitable ways and leveraged to close the digital divide.
6. **Technology should only be used when beneficial for teaching/learning.** Before using any technology for teaching and learning, we should first ask ourselves, how does it benefit teaching and learning?

Application Questions

A school district has recently decided to adopt a technology initiative with a focus on educational robots (e.g., Sphero, Dash, LEGO, Ozobot) for all students and teachers. They believe that robots can help support a student-centered personalized instructional approach to learning where technology is utilized in meaningful and equitable ways. They hope that robots will help improve students' computational literacy, learning achievement, engagement, collaboration, and communication. Although some teachers are excited about the initiative, many have concerns

and questions about how they can use the devices in their classrooms to support students with various learning needs. The school district would like you to help in several ways:

1. Provide the school district with ideas on helping with technology adoption. In other words, describe three or four ways in which the district can help support teachers (especially those with concerns and questions) to adopt and successfully integrate technology.

2. Develop a workshop to provide teachers with ideas on how to use technology resources and robots. Keep in mind that providing subject-specific examples can help connect with teachers and enable them to see practical ideas they can directly transfer to their classrooms. Describe the workshop.
3. The school would also like to investigate methods to keep the cost down. What recommendations could you make to help keep the cost of the program down?

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Instructional Designers in Higher Education

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The profession of instructional design and those working in this profession, known as instructional designers, have contributed to development and progress in several professional contexts (e.g., military, business, K–12, non-profit, consulting) in the past several decades. They are also referred to by other titles, such as learning designers, learning technologists, instructional technologists, learning scientists, or learning experience designers. For our purposes we will refer to instructional designers to include all such similar titles. In higher education, instructional designers can be found in all types of institutions and contexts, ranging from community colleges to liberal arts universities to research-intensive universities. These professionals also span the organizational structure of their institutions and can be found in centralized units focused on specific areas such as online course development to centers of teaching excellence offering a range of educational services to faculty and students. Often, these professionals can also be found in decentralized units, such as a college within the university structure, for example, a college of education or college of nursing. Regardless of where instructional designers fall within an institution's organizational structure, the range of services these professionals provide and the competencies they need to succeed in these roles share much in common.

Instructional designers in higher education come from many different backgrounds and have varying professional and academic experiences that have prepared them for the role. There is not a single path to enter into this profession, resulting in professionals with diverse backgrounds and approaches influencing teaching and learning in higher education. However, it would appear that individuals with educational backgrounds and teaching experience are well-equipped for this role (Ritzhaupt & Kumar, 2015). While graduate and select undergraduate programs are designed to prepare instructional designers (e.g., learning design and technology, educational technology,

instructional systems) for entry into the workforce, it appears that some in the profession transition from other roles (as both lateral and vertical movements) within their organizations. Others complete certificate programs to enter the profession. Instructional designers in higher education thus bring diversity and a wealth of knowledge and skill to the craft of instructional design, which has become essential for the design, development, implementation, and assessment of online, blended, Hyflex, and face-to-face teaching in institutions of higher education.

Instructional designers in higher education provide services to their institutions in the form of teaching and learning consultations, online course design and development, educational pedagogical and technical support, professional development experiences, educational multimedia and video production, accessibility and quality assurance, research and evaluation on learning experiences, educational technology integration expertise, and more. These instructional designers must possess a range of knowledge, skills, and a disposition to work amicably with faculty and diverse professionals to accomplish their objectives. The purpose of this chapter is to provide a brief overview of the roles, responsibilities, and necessary competencies for instructional designers in higher education. We will end by providing suggestions on how to become an instructional designer within a post-secondary institution and some current trends and issues shaping the work of instructional designers in higher education.

ROLES AND RESPONSIBILITIES

Instructional designers in higher education can provide their institutions with a multitude of educational services to meet mission-critical objectives. Instructional designers' roles and responsibilities in higher education appear to be moderated by the location of where they provide their services within the educational enterprise (Kumar & Ritzhaupt, 2017). For example, some instructional designers work in centralized design and development centers for their institutions, in which they are, for example, predominantly involved in the production of online courses. Yet others work in decentralized units, such as a college unit, and provide a range of services to their constituents beyond course production and improvement. The following are some example roles that instructional designers perform in their organizations. This is not an exhaustive list of all the roles instructional designers perform in higher education.

Analyst. Instructional designers are often involved in conducting needs analysis or performance analysis to identify learning needs or gaps. This includes understanding the audience/learners and their prior knowledge and assisting in addressing the learning gap through instructional design. At times this work may call on them to engage in data analysis or big data sets.

Designer. Higher education instructional designers are often deeply involved in the design of face-to-face, online, and blended courses offered by their institutions of higher education across academic units, at all levels (e.g., undergraduate, graduate) and for diverse learners. They regularly follow systematic processes and procedures for the creation of learning experiences and environments, particularly for both online and blended courses. Instructional

designers serve a critical role in institutions of higher education by implementing best practices for the creation, functioning, and continuous improvement of learning environments.

Multimedia Developer. Many of these professionals work with a range of software tools to carry out their roles and responsibilities, including course authoring packages (e.g., Articulate), learning management systems (LMSs) (e.g., Canvas), productivity software (e.g., MS Office), cloud-based solutions (e.g., Google Drive), image editing software (e.g., Photoshop), audio production software (e.g., Audacity), web languages (e.g., HTML and CSS), or video production software (e.g., Adobe Premiere). Multimedia developers in higher education are also often tasked with not only production, but prescription of multimedia solutions for their institution, which includes determining which multimedia solutions are best suited to their context and will produce the best return on investment.

Curriculum Developer. They contribute to the development and revision of academic programs to align with accreditation standards and program goals. This is most often done in conjunction with subject matter experts (SMEs) from specific content areas across the institution or within a unit. While instructional designers may assist or contribute to such development, it is generally accepted and understood that the curriculum itself (particularly the decisions about what content to include/exclude) is “owned” by the faculty, though the approach or methods are often suggested by instructional designers.

Pedagogical Expert. Instructional designers also employ models of instructional design (e.g., ADDIE model, backward design), theories of learning (e.g., constructivism, behaviorism, cognitivism, cognitive theory of multimedia learning), and a range of instructional strategies (e.g., project-based learning, flipped classroom, lectures, discussion, inquiry learning) to support faculty.

Technology Specialist. Instructional designers assist faculty to integrate technology into their courses, often helping to choose technologies suitable to learning objectives and learners. They also provide professional development, newsletters, and ongoing support about different educational technologies and pedagogies appropriate for the classroom environment. While there is usually a plethora of technology specialists within higher education information technology (IT) departments, it is often the case that instructional designers are consulted in terms of classroom design, technology usage, and applications in specific situations.

Accessibility Specialist. They are often involved in ensuring the accessibility of educational materials and offerings to meet the needs of diverse learners. They are also often consulted in thinking about how technology can enhance or ensure accessibility.

Instructor and Facilitator. Their responsibilities extend to serving as instructors or facilitators for professional development for faculty and graduate students in the form of online courses, workshops, and book studies; online certification programs; and more.

Consultant. Instructional designers offer one-on-one consultations for faculty depending on the need to design courses or to integrate technology into existing courses.

Project Manager. Instructional designers also assume the role of project managers while working on large instructional design projects. They

coordinate the efforts of faculty, multimedia developers, and other stakeholders to meet the project timeline.

Evaluator and Quality Assurance Expert. They serve as evaluators and quality assurance experts in evaluating courses and educational materials to meet standards such as Quality Matters and accreditations such as the Council for the Accreditation of Educator Preparation (CAEP). They provide feedback and recommendations for improvement on current, existing, or new programs, courses, technology applications, or professional development programs.

Innovator and Change Agent. Some instructional designers even experiment with emerging learning technologies, including artificial intelligence and augmented and virtual reality. They act as change agents in implementing innovations on their campus. They are most often early adopters of innovative technologies and processes.

Although they primarily identify undergraduate, graduate, and certificate students as the primary end users of their work and efforts, instructional designers in higher education most often work with faculty members regularly within their institutions, with the faculty serving as SMEs and instructors of the primary learning experience (Kumar & Ritzhaupt, 2017). During the COVID-19 pandemic, they played a crucial role in the shift to emergency remote teaching (Hodges et al., 2020) in institutions of higher education and experienced an expansion and shift in their roles (Abramenka-Lachheb et al., 2021). At this time, instructional designers supported various stakeholders (e.g., faculty, students, administrators) to transition to remote environments while transitioning to remote work themselves; for instance, they supported the implementation of HyFlex teaching, provided professional development, developed and disseminated learning materials in various formats, and strengthened their efforts to support all learners equitably across digital environments (Abramenka-Lachheb et al., 2021; Xie et al., 2021). The roles and responsibilities of instructional designers are thus constantly evolving in response to changes in educational environments.

PROFESSIONAL COMPETENCIES

Like many professional roles in the 21st century, the instructional designer in higher education is an evolving role that draws upon numerous competencies to achieve the objectives of their organizations. These competencies are a moving target since the field continues to rapidly evolve with new emerging technologies, pedagogies, and environments. This section summarizes the many competencies of instructional designers derived from numerous research studies exploring instructional designers' competencies, particularly in the context of higher education. These research studies used several methodologies, such as surveys of professionals, job announcement analyses, and even the Delphi method.

Strong Communication and Collaboration Skills

Instructional designers must possess a strong command of both written and spoken language. Research has consistently reported communication skills among the top competencies of instructional design professionals (Ritzhaupt & Kumar, 2015; Kumar & Ritzhaupt, 2017; Ritzhaupt et al., 2018). They are often

challenged with writing effective learning activities and materials, recording narration for online tutorials and videos, and engaging in deep conversations with project stakeholders (e.g., faculty, graphic designers, students, faculty, administrators) about learning theory and complex pedagogies (Ritzhaupt et al., 2018). Instructional designers are expected to be effective at articulating design configurations to meet the needs of the learning situation. When engaging with faculty as SMEs, or other relevant stakeholders (e.g., videographers) involved in the creation of online, blended, and face-to-face learning experiences, they must exercise interpersonal communication skills to create an atmosphere of teamwork and collaboration.

Knowledge of Learning Theories and Instructional Strategies

Instructional designers are well-prepared in learning theories and relevant instructional strategies for supporting different learning situations and outcomes. They use learning theory to guide their instructional decisions, inform instructional strategies, and create learning experiences for a given learner population, content domain, and delivery format (e.g., online).

Instructional designers typically do not subscribe to a single theory or method of learning; many instructional designers, instead, utilize an eclectic approach to theory (Ertmer & Newby, 2013; Ritzhaupt & Kumar, 2015), drawing from each of the core learning theories to create their learning solutions. Some do have a strong tendency toward behaviorist or constructivist approaches, or prefer lectures to discussions or inquiry-based approaches. But in general, a more eclectic approach serves the instructional designer best so they can adjust depending on the needs of a particular project or goal. Instructional designers must keep abreast of the latest emerging technologies available in their institutions and signature pedagogies that create student-centered learning environments across academic domains.

Instructional Design Models and Processes

Instructional design models and processes are the cornerstone of the craft of instructional design and provide the designers with guidance and processes to ensure quality learning solutions are developed and implemented. Instructional designers have a wide array of instructional design models (e.g., Dick & Carey [Dick & Carey, 1996], Backwards Design [Wiggins & McTighe, 2005], and Merrill's first principles [Merrill, 2002]) to choose from. While several professionals opt for a specific instructional design model of their preference and liking, most instructional design models share similar ideas and components (Branch, 2009; Reigeluth, 1999). Many instructional designers reference the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation) when describing their workflows and processes for work. Instructional design professionals need to be able to choose the appropriate instructional design model for a given learning situation and the relevant instructional processes to ensure a successful implementation of their design.

Project Management Knowledge and Skills

Instructional designers in higher education environments find themselves working across several projects and wearing the hats of multiple stakeholders

involved in the creation of learning experiences and environments, often the role of project manager. Though many instructional design projects in higher education might be considered small in terms of budget and scope (e.g., creating an online course), there are still many different stakeholders (e.g., faculty, students, videographers, graphic designers, LMS programmers, administrators, students) and constraints within the higher education environment that designers must be equipped to address (Kline et al., 2020). Instructional designers are also expected to establish a rapport with these individuals while meeting the scope, budget, and schedule of a project. Though project management in and of itself is its own established body of knowledge (e.g., PMBOK, the Project Management Body of Knowledge) (PMI, 2017), the field of instructional design borrows many of the concepts and techniques (e.g., critical path analysis) from project management to carry out the complex projects (van Rooij et al., 2010).

Technology Literacy Skills

Instructional designers work with a wide range of software packages ranging from office productivity software such as word processors (e.g., MS Word), presentation tools (MS PowerPoint), and spreadsheets (e.g., MS Excel) to educational software inclusive of learning management systems (LMSs) (e.g., Canvas), assessment tools (e.g., Respondus), and educational authoring software (e.g., Articulate). Other common software solutions include cloud-based software (e.g., Google Drive), mark-up languages (e.g., HTML), cascading style sheets (e.g., CSS), video production software (e.g., Premiere), video conferencing software (e.g., Zoom), and multimedia production tools (e.g., Photoshop, Adobe, Captivate). In addition to using emerging technologies such as simulations, augmented reality, and virtual reality for teaching and learning, instructional designers also must keep abreast of generative AI and its use in higher education. The personalization of instruction, assessment (e.g., question generation, grading, feedback), the creation of curriculum, and the use of digital tutors are some examples of such use. Instructional designers use these and other technologies to create effective instructional resources, course offerings, and professional development for their institutions.

Assessment and Evaluation

Instructional designers should be able to implement the assessment and evaluation of learning experiences and environments. Assessment involves both traditional (e.g., multiple-choice quizzes, final exams, or essays) and authentic assessment (e.g., e-portfolios, observed field performances) methods for documenting student learning objectives as well as more innovative or experimental assessments (e.g., videos, blogs, reflective novels, published works). Instructional designers assist faculty members in aligning their courses by aiding in the development of student learning objectives, assessments, and learning activities to support the students in achieving the learning objectives. Additionally, instructional designers use the assessments to support the summative evaluation of these learning environments by intentionally and systematically examining these data sources to make informed decisions about the current design configuration after the learning experience has been

completed (Ritzhaupt et al., 2021). Instructional designers also employ methods from formative evaluation in which they conduct one-on-one interviews or think-alouds, focus groups, and consult with SMEs prior to the full launch of a course (Morrison et al., 2019). Instructional designers are also often asked to conduct more summative evaluations, including return on investment, though this is less frequent in higher education. With the current budget challenges all of academe is experiencing, it is likely that this will be an increasing concern.

Professional Development and Support

Instructional designers often provide a range of professional development experiences primarily for faculty, but also for graduate students with teaching assignments, staff, and administrators. These professional development experiences can be in the form of pedagogical (e.g., flipped classroom) and technological workshops, online courses, certification programs for teaching online, book studies, webinars, one-on-one consultations, and more. Instructional designers might even create and send technical support videos to those who are trying to implement new technologies in their classrooms. Instructional designers also often provide ongoing support for different pedagogical and technological innovations used in higher education classrooms. Thus, they must be equipped with the latest emerging educational software and instructional strategies useful for different educational outcomes across a range of academic programs.

Change Management and Leadership

Instructional designers in today's universities and colleges are change agents who provide instructional leadership to their institutions. They are capable of implementing new innovations in their complex enterprises and sustaining those innovations in their settings. Instructional designers are change agents for teaching and learning in higher education and assist their organizations in transforming the practices employed in online, blended, and traditional classrooms (Pollard & Kumar, 2022).

BECOMING AN INSTRUCTIONAL DESIGNER IN HIGHER EDUCATION

As previously noted, there is not a single pathway to becoming an instructional designer working in the context of higher education. While there are ample academic programs offered at the graduate level to choose from, there are very few academic programs at the undergraduate level available to aspiring instructional designers (Ritzhaupt & Kang, 2015). Awareness of the field of instructional design is not as ubiquitous as other professions, like software engineers or accountants, and thus, the knowledge of career opportunities is not as well-known in earlier levels of education (e.g., high school). Additionally, many instructional designers end up in management roles, which typically require graduate-level education. However, instructional design positions are appearing across professional contexts (e.g., higher education,

military, business) with an increasing trend based on recent job announcement analysis findings (Wang et al., 2021). We outline some common pathways for aspiring instructional designers, and some continuing education avenues for practicing instructional designers to stay relevant.

Academic Preparation

Instructional design academic programs use many different programmatic titles for the academic discipline, including learning design and technology, educational technology, instructional design and technology, instructional technology, instructional systems, learning sciences and technology, learning engineering, learning sciences, and more. Though the larger field cannot seem to agree on a single name for our academic programs or even our discipline, much of the curriculum across these different programs includes formal experiences in instructional design. Instructional design programs are typically offered at the graduate level in the United States, and while they are most commonly packaged as formal master's degrees, they are also packaged as graduate certificates. However, job announcement analysis has shown that the requirement is to have a bachelor's degree for most instructional design positions with only some positions requiring a master's degree (Wang et al., 2021). A master's program analysis also demonstrated that the academic curriculum across these programs varies but generally includes coursework in learning theories, instructional design, project management, multimedia production, and select topics in the application of emerging technologies for learning (Martin et al., 2022).

Informal Learning Experiences

There is a wealth of informal learning opportunities for aspiring instructional designers available on free and for-fee platforms, such as EdTech Books and LinkedIn Learning. These are helpful resources for a range of instructional design areas, including topics like adult learners, blended learning, gamification, agile development, and more. Aspiring instructional designers should review the resources appropriate for their preparation as instructional designers or seek guidance on which resources to begin with from the professional community, while current instructional designers should create professional learning plans to advance their knowledge and skills of the craft. Many of these online resources include instructional videos, practice assessments, online consumer reviews and ratings, and some are even distributed as open educational resources (OERs).

Networking and Professional Associations

As instructional designers are professionals, they should seek networking and professional advancement opportunities to gain additional skills and knowledge on an ongoing basis. Often these opportunities are a facet of joining professional associations that serve the field (such as the Association for Talent Development [ATD], the Association for Educational Communications and Technology [AECT], the Online Learning Consortium [OLC], or EDUCAUSE) (Ritzhaupt et al., 2020). All of these professional associations provide

networking and learning opportunities in the form of conferences, webinars, professional readings, awards, certifications, and other opportunities for professional growth and leadership development. Both aspiring and established instructional designers attend these conferences and other learning opportunities for their growth and advancement within the profession.

Internships and Applications

Instructional design academic programs often include an internship component, client projects as part of their coursework, or connect their students with clients who provide internships. If these are not available, students can seek out faculty or departments at their institution that need instructional design assistance for their courses, programs, websites, or projects. These experiences can help novice instructional designers acquire real-world experiences that can be valuable for future jobs and job applications. Student career resources centers at higher education institutions; resources, networks, and mentors within professional associations; and online career preparation resources can guide future instructional designers in drafting applications and preparing for interviews for instructional designer positions. Continuing formal or professional education, certifications in specific technologies, and scholarship focused on instructional design or teaching and learning can also strengthen applications.

Professional Growth on the Job

Much of the knowledge and skills employed by instructional designers are learned within the work environment by observing senior instructional designers, trial and error, guidance from instructional team managers, and completing instructional design tasks and projects for real-world situations. Instructional designers are often prepared following the principles of a cognitive apprenticeship (Mancilla & Frey, 2020) in which senior designers model the behaviors and actions that are expected in the job performance in a work environment. Many emerging instructional designers will identify mentors within their organization and in the professional community to support their growth as a designer.

TRENDS AND ISSUES SHAPING INSTRUCTIONAL DESIGN IN HIGHER EDUCATION

Several forces work together to shape the field of instructional design in the context of higher education. Institutions of higher education are being transformed by several factors, such as cutbacks in state funding, online learning, demands for workforce readiness and preparation, and increased scrutiny from legislators and the public. Current universities and colleges are evolving from traditional brick-and-mortar with a single product (e.g., degree) to increasingly complex providers of technology-enhanced learning solutions to address goals like accessibility, and creating effective, efficient, and engaging learning environments and experiences for both traditional and non-traditional students in face-to-face, blended, and online settings. These solutions are packed in many ways, such as graduate certificate programs,

continuing education programs, micro-credentials, traditional degree programs, OERs, and more. Institutions of higher education have diversified their offerings to respond to environmental factors.

Institutions of higher education are testing the affordances of a wide array of emerging technologies for teaching and learning. Emerging educational technologies like augmented reality, virtual reality, artificial intelligence, and neurotechnology are penetrating higher education teaching, research, and development, and instructional designers are often the experts leading the way with these innovations. Universities and colleges are also changing the way in which they engage their student population by adopting student-centered teaching and learning strategies. At the center of this transformation are the Centers of Teaching Excellence, which are specialized organizational units found within institutions of higher education that provide a wide array of educational services to the teaching faculty and graduate assistants to support student-centered teaching and learning strategies (e.g., flipped classroom, project-based learning, case method).

Emerging Educational Technologies

Emerging educational technologies can be a tricky term since the notion of an emerging technology is a subjective construct and not bound by a strict definition. We use the term to describe technologies that are in the early stages of development and the exploration of its utility is not fully understood in teaching and learning. At present, institutions of higher education use a range of technologies to support the teaching and learning mission. However, emerging educational technologies are currently being explored for educational potential across academic disciplines. Artificial intelligence tools like ChatGPT and other large language models offer both benefits and challenges in the classroom. Another emerging technology currently influencing instructional design is augmented and virtual reality, often referred to as eXtended Reality (XR). Instructional designers create learning situations using the affordances of these technologies for educational purposes. Emerging technologies are shaping the role of instructional designers in higher educational settings.

Online Learning

Online learning is now a staple of the higher education enterprise, with steady growth each year and the grand challenge of creating accessible learning experiences for diverse learners across geographical boundaries and borders. Online learning has opened the doors to students who otherwise did not have access to formal education. Instructional designers are the key asset in higher education organizations to create effective, efficient, and engaging online learning experiences and environments. Instructional designers support faculty as SMEs in creating instructional resources in the form of learning objectives, activities, discussions, and assessments to facilitate student learning. Instructional designers also keep abreast of online teaching best practices and are well-seasoned in accessibility issues for online resources. Instructional designers will continue to be active participants in the creation of online courses and help maintain the full life cycle of online courses.

Student-Centered Pedagogy

The traditional model of the university lecture format has been shown to disengage and result in passive learning experiences for students (Fischer & Hänze, 2019). As a result, the “sage on the stage” model of learning is slowly losing support from university professors in favor of more active and student-centered learning (King, 1993). Active models are often referred to as the “guide on the side” model, in which professors fulfill the role of a facilitator of learning experiences. Although there is not a clear definition surrounding the concept of student-centered teaching and learning methods, many have supported pedagogies that lead to active learning engagement during class time. Examples might include the flipped classroom instructional strategy, the case study teaching method, problem-based learning, role-playing, and many more strategies. Instructional designers are helping to lead the change in Centers of Teaching Excellence to transform the teaching and learning models within institutions of higher education.

CONCLUSION

Although instructional designers in higher education provide a range of services to their institutions, the roles, responsibilities, competencies, and factors shaping this profession are not well-understood and continue to evolve. We hope this chapter provides an overview of this opportunity within higher education settings by unpacking some of the current research and writings on the topic. Instructional designers are a critical part of the modern post-secondary educational environment. As this role continues to evolve with technology, pedagogy, and environmental factors shaping the nature of the work, those individuals seeking employment within this context will find challenging and rewarding careers ahead of them.

Summary of Key Principles

1. Instructional designers can be found across different types of institutions of higher education and work within both centralized and decentralized structures in these institutions.
2. Instructional designers in higher education have many responsibilities (e.g., online course production) and fulfill the roles (e.g., analyst) of many different areas within modern institutions.
3. Instructional designers are multi-skilled professionals who possess competencies in several areas, like communication and collaboration, project management, learning theory and strategies, and more.
4. There are many different pathways to becoming an instructional designer in higher education, including traditional academic degree and certificate programs.
5. Several forces (e.g., emerging technologies) are working together to shape the role of instructional designers in modern institutions of higher education.

Application Questions

1. You are an instructional designer in a college of medicine at a land-grant university in the United States. You work in a department (called e-Learning and Creative Services) that supports medical students and residents for the college's medical curriculum, which is delivered in a blended format. The team carefully works with the faculty in the college to create a robust curriculum. Your manager – Rick – is the associate dean of the college and supervises a team of instructional designers, videographers, and multimedia developers. The team works with the faculty members in the college to create a blended curriculum with many different educational technologies, particularly the LMS. Rick observes that the faculty struggles to align the learning objectives, activities, and assessments when creating their course materials. He asks you to create a professional-looking template, preferably an MS Word table with simple instructions as a job aid to help the faculty better plan their course materials. The job aid should be easy to use and show the alignment among the student learning objectives, the learning activity, and the assessment.
2. Assume you are working with a faculty member in the humanities to design an Introduction to Philosophy course online. You meet with the faculty member to discuss the course objectives and approach the faculty member takes with the course. You learn this is his first time teaching online and he has never designed an online course before. During the meeting, you learn that he would like to provide short videos on each topic in the course. He indicated that his student evaluations suggested his oratory skills were an important aspect of the learning experience. He described his face-to-face course, which uses a combination of lectures, whole-group discussions, quizzes, independent essays, and a group project. He said he was concerned about using traditional quizzes online but felt that the essays in the course were critical to student learning. He has prepared his own PowerPoint slides for his course over the years and uses an OER textbook that he participated in creating. Using this information, prepare a one-page response to the faculty member by providing useful pedagogical and technological solutions to address his concerns. What recommendations would you make to this professor given the information provided?

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Stories From the Globe

Practitioners' Voices on Instructional Design and Technology

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The field of instructional design situates itself in varied spaces, places, times, and positions. It is not bounded by a country and can be pursued in isolation or as a skill alongside or embedded within another. A familiar approach to designing for and with instruction can look different to people and be evidenced in societies differently. This chapter discusses how the field manifests in varied countries, with cases highlighting contexts of how the field prospers.

The growth of the field can depend on lines that some use to identify how the field should progress, what theories exist, and how they are validated. Perspectives which push designers and scholars alike will only allow for growth by identifying gaps – gaps which are formed from contexts which introduce views from culture and positions (i.e., intersections) (Crenshaw, 2017). These gaps capture what most label cultural perspectives – where different geographies, based on policies, economies, societal dispositions, technologies, and infrastructures have a major influence on how instructional design is conducted for learning and performance, what “instructional design” is called, and when it is used (Dickson-Deane & Sutherland, 2022; Pelletier et al., 2022). Reaching learning and performance for a specific goal requires an in-depth understanding of the situation where this goal will be achieved. This can include language differences, ethical considerations, and ways of thinking which challenge the theoretical foundations of the field.

This chapter uses stories from different geographies (i.e., global voices) to provide clarity about how the field is used for contextual impact by answering the question “What instructional design and technology (IDT) design activities are commonly being experienced in the country where you reside,

and which ones (if different) do you employ in your professional practice?" These stories were collected from practitioners who are aware of the clear distinction of the field, knowing that in their part of the world the field may just look different. Each story is described as *a voice* to denote a level of subjectivity yet realism to each of the stories.

Yeqing's (Frank's) Voice

Who Am I?

As a university of Reading and Nottingham graduate in food science, my interest in project management guided me to move to New Zealand for work. My past experience as a teacher and mentor in various schools created enriching insights into the field of learning design. Migrating to New Zealand from China (via the UK) gave me the opportunity to use my expertise in food technology as a stepping stone to cross-disciplinary knowledge. I'm a committed PRINCE2 (PRojects IN Controlled Environments) practitioner – a project management certification – and I apply this as a project manager at Open Polytechnic, Te Pūkenga – New Zealand Institute of Skills and Technology.

My Experience in New Zealand Is Different

In my role, I engage in collaborative efforts with learning designers, subject matter experts, and contractors to develop specialized online courses. Our initiatives are government-funded, emphasizing the production of content that incorporates diverse industry insights and viewpoints. A significant focus of our methodology is on co-designing and bi-cultural designing activities. This is especially pertinent in New Zealand, where the integration of indigenous Māori culture with academic disciplines is a vital expectation. Our courses incorporate input from Cultural Appraisers to ensure the perspectives of Māori and Pacific nations are integral to our programme designs. The Open Polytechnic prioritizes the inclusion of Māori pedagogy and content in our courseware, providing continuous and robust support throughout the learning journeys of our ākonga (students).

An example of this approach is evident in our Bachelor of Engineering Technology programme, specifically in a course titled Water and Waste Treatment. This course extends beyond conventional engineering methodologies to encompass the perspectives of tangata whenua (local Māori people) on wastewater management. It explores the cultural values and attitudes of iwi (local tribes) around Turanganui a Kiwa (Poverty Bay), particularly their views on wastewater and its management strategies.

In a similar vein, Te Pūkenga has been instrumental in collaboratively developing three unified programmes: Bachelor of Nursing – Māori, Bachelor of Nursing – Pacific, and Bachelor of Nursing. These programmes were co-designed with reference

groups, focusing on establishing the guiding philosophies and ngā mātāpono (guiding concepts) for each. This collaborative approach exemplifies our commitment to equitable design decision-making in partnership with Te Pūkenga and Te Tiriti partners, integrating te reo and tikanga Māori, while acknowledging the socio-political implications of the Treaty of Waitangi. Furthermore, we are dedicated to enhancing the social and emotional wellbeing of both students and educators. This commitment is reflected in our efforts to integrate mental health programmes within our courses, striving to balance academic achievement with the overall wellbeing of students. Lastly, a noteworthy trend in New Zealand education is the increasing engagement through gamified learning and eSports. We recognize the potential of these methods to boost not only academic performance but also social-emotional learning. Despite concerns over potential overreliance on online gaming, our experience with eSports teams has been largely positive, demonstrating their beneficial impact on student engagement and development.

What I Do as a Project Manager in IDT/LDT

As a project manager, a recurring challenge I encounter is enhancing the role of subject matter experts (SMEs) within projects. Project teams, being temporary organizations, often include dedicated learning designers working with SMEs. However, there seems to be a limitation in improving SME performance to enhance project outcomes. Typically, the inherent attributes of an SME are what the project must adapt to, which can be a significant hurdle.

One potential solution might be to draft more precise contracts for SMEs, ensuring clearer expectations and guaranteed deliverables. This approach could involve setting early performance benchmarks, where failure to meet these could result in re-evaluating their role in the project. Additionally, the recruitment of academic staff members (ASMs) with relevant expertise could be a strategic move. Temporarily transferring ASMs to these new positions just for the design and development phases of projects could substantially improve outcomes. This strategy, however, presents resourcing challenges, a common issue in project management within instructional design. Moreover, integrating hybrid project management methodologies, like combining waterfall (i.e., a linear yet sequential process) and agile (i.e., an iterative process) approaches, could lead to more tailored and relevant project outputs. The application of diverse project management techniques in learning design is still evolving, reflecting the broader progression of project management as a discipline. This situation underscores the potential benefit of a comprehensive database for learning designers. Such a resource would detail their skills, experience, and expertise, facilitating the alignment of specific project needs with the most suitable learning designer. Recognizing the diversity in

learning design skills is crucial; not all designers need to possess the same skill set. By maintaining this database, we can more accurately match project requirements with the appropriate learning designer expertise.

Monica's Voice

Who Am I?

I am from Guatemala, a Central American country just south of Mexico. My experiences as a practitioner are influenced by my master's degree, which I received in the United States as a Fulbright Latin American Scholarship Program of American Universities (Fulbright LASPAU) Scholar in 2012. I call myself a learning experience designer for the field of eLearning, as I focus on how learners enjoy their experiences – their holistic experiences – in an eLearning environment. I learned about the field in 2002 whilst pursuing a major in education and fell in love with the dynamics of eLearning, so pursuing further studies to enhance my abilities in the subject was an easy choice.

What I Do in Guatemala

The term instructional designer was not a noted position 15 years ago, and there were very few educators for eLearning. I started doing instructional design work at a private university with a fellow colleague and from that began the movement of eLearning. As the field of education has evolved in Guatemala, instructional design is a much more visible profession, so much so that there are jobs on offer. This new trend of instructional design brings to the forefront the past, where my colleagues and I were known as educators who created resources for distance learning – with no formalised title for what we did. Giving a name to the actual activity has paved a way for people to understand the need for the skill that is the instructional designer. For example, at universities the teacher who delivers courses online is still a teacher who has to do everything from deciding on the content to designing the content for instruction to delivering it to the learners – in other words, the instructional designer and the facilitator are one. But in some places, they are beginning to separate those roles, to actually give the instructional designer the role of helping the facilitator in creating that environment. In this educational ecosystem, it is now becoming clearer that there are subject matter experts for the discipline, and they may not understand how learning happens. In steps the learning designers who have the knowledge of the theories and understanding of the “how”. This new trend in Guatemala is now evident and that is good, as it is also expanding into degree offerings at the university – where there was only a degree in education, now there are programs preparing people for careers in instructional design.

As education is growing as a career, what is still challenging is what actually occurs in the profession. I love to design the instructional message – I specialise in the message. I am not, however, a fan of building the resources with the graphics and everything that is involved – although I did it for a while. I know about platforms, and I’m able to put things in Canvas, Moodle, and whatever, but it’s not me. I remember during my studies at Virginia Tech, Dr. Cennamo referenced her book *Real World Instructional Design* (Cennamo & Kalk, 2019) where, in Chapter 8 or so, she said your job as an instructional designer stops here and then starts all the development, all the graphic design, all the platforms, all the technical issues, etc. This was eye-opening to me because I had been doing everything. And it made sense because you will need to know all the technical parts, all the technology that is emerging. Of course, an instructional designer needs to know the affordances of technology right to put it in the design. Because I am a translator, what I love about the instructional message design is to kind of “translate” the elaborate experience of the SME to a language that engages the learner to look for more and go deeper. I always compare both jobs of the translator and the instructional designer, as professions in which we bring the ideas from the language of someone into the language of another person. The difference is that as instructional designers, we are also helping the learners learn the new language and eventually speak the language of the SME fluently.

My View on the Field of IDT

The IDT field is a very small space, but everyone can find their corner. I do instructional design for competency-based learning. So that means I try to focus on what learners will be able to actually *do*, where they actually practise while learning. The instructional design I’ve seen has been like testing about knowledge, . . . right concepts. When I work with people who do that and they see me working with the idea of providing practice for the learner, which is more engaging, more complex, I get a conversation which says, “but that solution doesn’t have a grade.” My response confirms such and then the response is “but they are not going to do it if there is no grade.” I believe if they discover that it’s valuable for them, they will do it. And that’s something that I think is important – we need to have the mindset that we don’t need to force people to do things. We just need to engage them in learning and if they engage in discovering that the practice helps them be more competent in whatever they’re learning, they will do it.

LeRoy’s Voice

Who Am I?

I am a learning designer and academic leader who originates from Anguilla but works in Trinidad and Tobago – both countries in the

Caribbean. My education is from the University of Nottingham in the UK, with further education in Manitoba, Canada. I see myself as an enabler of others, in that I challenge and support individuals to advance themselves into various avenues of excellence. Be it in my teaching in the ID field or my leadership role in HE, I live for the moment to see others transform.

What Challenges Are There in Trinidad?

The main challenge is of technology integration and access. Trinidad and Tobago, like many other countries in the Caribbean, experience the challenge of effectively integrating technology in learning environments. This in part is due to the challenge of equitable access to devices and reliable internet for the various stakeholders involved. For this reason, the design implications as well as learner experience are impacted. This issue was highlighted during the pandemic. While we have made inroads into the development of learning environments and technology integration, there remains a strong digital divide that continues to impact opportunities for some. The digital divide also illuminates the diversity issues in the country, where cultural sensitivity and relevance are impacted. There is a need to deepen commitment in the adoption of socio-cultural indigenous perspectives in designing learning experiences. Designing learning experiences that are relevant and inclusive to the local Trinidad and Tobago diverse population is a challenge but also an opportunity. This includes making content that learners can relate to in the local context. Many designers are tempted to adopt cases, strategies, and instructional artifacts that are not culturally sensitive to the local context just because of traditional knowledge and inability to translate and transfer solutions. Additionally, the one-size-fits-all approach works well for many, as they are catering for commonalities in curriculum and not the learner. While many practitioners may tout the idea of differentiating content, process, and product – this is not widely practised, as it is such an easy fix to adopt more cookie-cutter approaches. Thus, adaptive and personalised learning, in my view, will continue to be a challenge. Therefore, to reflect the contextual challenges, there is an increased interest for more online and blended learning, partly due to the pandemic. In order to support this, institutions are pushing for more faculty training and support – general upskilling in digital tools and understanding what student engagement means.

My View on the Field of IDT

I am reminded of the need that while content is king, the presentation of such can have an impact on the learning experience. For this reason, the idea of micro-learning and chunking of content is growing more popular in this region. More organisations are valuing this in their credentialing approach, as it requires less time to commit to organisational resources. They are also faster bouts of

success and provide a quicker way to meet learning outcomes for the busy learner. With the onset of XR and now AI the field needs to adapt to incorporate creativity more.

Wanjira's Voice

Who Am I?

I have had a long, varied journey as a learning designer, wearing different hats. I was born in Kenya, where I started my education and eventually moved on to finish my PhD in the United States. I started as an instructional designer, working on assignments with different corporations and also as a doctoral assistant at the university. Thereafter, I taught at Georgia State University for many years, first as an assistant and then as an associate professor. I really enjoy research and working with students, you learn so much! So, the origin of my experiences is from academic and industry perspectives, most of which were technical, for example, in the industrial sector or working with Technical and Vocational Educational Training (TVET) skills. Then, when I left full-time teaching, I also began to consult because of my background in learning design and international development. For the last eight or so years, I've worked with non-governmental organisational (NGOs), non-profits, United Nation (UN) agencies, and multilateral development banks (MDBs) in different learning, design, and eLearning development capacities. Reflecting on my experiences in the United States and Caribbean, Middle East, and various African countries, and now at home in Kenya, I view everything as what you learn from one context and bring to another. I always find context for what I do in this or that area and find ways to bring it back to the classroom – I still keep a foot in teaching and research.

What I Do and Experience in Kenya

One of the things I've noticed, and I think maybe is a common answer, is that the pandemic demystified many things. Before, I would try with little success to explain to others what I do for a living. They would say – Did you say industrial design? Is that something designed? Is it interior design? People didn't quite get it. But in the last maybe three or four years, that has been somewhat clarified. There is also a mix in terms of people who picked up on eLearning and instructional design. As people are resisting technology, some are becoming confident in using technology. One example is M-Pesa™, the highly utilized mobile money service that even those with no bank account use to conduct business and receive money from family and friends. The idea that a phone can be used for certain things, including learning, talks to the diffusion that is occurring with the use of technology – with the government as well as institutions in higher education having a vested interest.

From a business perspective, the development of training materials is outsourced yet created in-house using software like Articulate Storyline. I suspect this is due to limited human resources with the specific skill set required. On the other hand, some institutions are using solutions such as LinkedIn Learning as the main provider for their in-house training. These sorts of solutions also incorporate micro-learning, which allow for three to five minutes of video-based training on generic topics such as workplace harassment and ethics – an affordable investment in digital learning. At the same time, funding agencies acknowledge the contribution to learning as an activity that can be added to research grants. This allows for collaboration between entities as they identify funds for consultants in monitoring, evaluation, and research – a scenario that is becoming prevalent with the request for learning designers in the healthcare and agriculture industries, as an example.

My View on the Field of IDT

Three trends come to mind: the internationalising of instructional design, contemporary approaches to the field, and inclusivity and accessibility. Regarding the internationalisation of the field, some institutions are now more willing to look outside of a particular context or country. When I was doing my doctoral research, it took a while to put together my committee because there weren't that many professors with an interest in what I wanted to study. So, I came up with the closest topic I could because I couldn't find a way to marry my international development interest and experience in learning design. I've seen that change, but it's taken more than 20 years to come this far.

Traditional approaches like ADDIE and backward design laid the foundation for designing courses and curricula. But now, fields like project management, leadership, and ed-tech policy are integral to the conversation, and more research is being conducted in these areas. These elements of the practice, along with the increased use of social media and digital learning, make it easier for practitioners from other fields, like finance or healthcare, for example, to acquire certificates and other credentials and be part of the learning design field.

Finally, there is more research and interest in inclusion and accessibility, especially when discussing digital learning. I think the assumptions about computers, whereby anybody can access them, creates a simplistic view of the field. Comments about the screen size, colours used in content designs, and just the overall ability to see the content on screens should be seen as more important. Thus, a conscious decision to include concerns for different abilities in the standards is key.

Virna's Voice

Who Am I?

I consider myself a teacher educator and an educational developer. My own formal higher education began in Italy where I was born,

studying French and English. On a visit to England, I decided to transfer my studies and move there. After graduation, I was focusing on teaching foreign languages, and then in 2001 I participated in a new provision, a teacher “training” programme called Post Graduate Certificate in Education (PGCert). This course was a new governmental initiative to professionalise post-16 educators. Whilst pursuing this programme I was looking for work in that emergent field, as I had fallen in love with developing teachers in what we call in the UK “post-16 education.” I was offered work as an adjunct in the same teacher training programme I had just completed. For a while I was teaching languages as well as on the PGCert until 2010 when I dropped languages and took up roles that were only in teacher education.

In my current role, I lead the in-house PGCert where I support in-service teachers (who are not qualified yet) to complete the internal PGCert staff development course worth 60 credits at the postgraduate level, which is $\frac{1}{3}$ of the credits required for a Master in Education/Teaching. I’ve ensured that the offering is practice-based, which entails a focus on learning about learning design and its place in teaching.

Researching the challenges of implementing more inclusive learning design and the use of threshold concepts is my passion, which has led me to publish a book on inclusive learning design (Rossi, 2023). Yet, integrating inclusive learning design through the PGCert programme is challenging due to internal and external constraints.

Key Issues About My Work in the UK

For the higher education sector in the UK, finances are a large challenge, and this is coupled with the new trend of unethical use of artificial intelligence (AI). Brexit has contributed to changed funding, fees, and associated policies in this country. This has affected the ease with which the UK was able to recruit students from mainland Europe. Overseas fees are very high, and there is much competition to attract overseas students. Research funding cuts and increased costs are making it difficult to attract and retain the best talent.

Just as there is growing momentum regarding inclusive learning design (to support the extremely diverse and growing student body), AI has shaken the field to its core, creating a conundrum of how to proceed. These pressures and new waves of tools add to my workload.

Due to the small size of our institution, for many years I have not been part of a team or of a teaching and learning unit, but I have been professionally isolated internally in my educational development work. The various management changes have also meant that I have had to be very proactive and resourceful at all stages of the course design and development, managing recruitment, set up, running the course, assessment, and accreditation. The operational

nature of my role has meant that my research profile has taken much longer than I would have hoped to develop.

Limited resources often mean limited scope to design and develop “enrichment” activities for the PGCert participants. This also applies to the participants: I need to be realistic about how much staff/students can give, with the result that the course is mostly offered on a “skeleton” basis, focusing on the core learning only. However, overall, participants develop and often transform their practices as a direct consequence of the learning on the course and often get more involved in further SoTL activities, which I am then challenged to support.

What I Think About the IDT Field

Due to post-pandemic stress, global conflicts, higher cost of living, and other factors, the field is struggling with the increased need for emotional and mental well-being. This applies to all levels: management, educational developers like me, university teachers, “para-academics,” and students as well.

In our role to develop staff, as much as we provide skills and expertise for the staff we are supporting, having enough time for one’s own development, and doing so whilst keeping a reasonable work–life balance is a definite issue.

This on top of the priorities of AI ethical use and ongoing efforts around inclusivity is top of mind for academic staff who need to design, develop, and implement education for an increasingly diverse student body with all the challenges this entails. Being supportive in these areas requires us all to be slightly ahead of the game and become familiar with the new tools/platforms, their limitations, and their affordances in order to be in the position of helping colleagues use them wisely.

Briju’s Voice

Who Am I?

I am from and reside in India where I help educators make better decisions in the learning design process. I teach and design for learning using my Ph.D. from Ohio University along with my certifications in higher education teaching, team-based learning, and project management (PMP certification). My experiences also include being a *Quality Matters* peer reviewer and serving in an advisory capacity to the G. S. Gawande College in Umarkhed, India. Being educated and working in the US then returning to my home country has been the guide for me in this field of instructional design.

Practicing, Teaching, and Researching Instructional Design in India

In India, there are few institutions providing certifications or training in instructional design. The field of instructional design

(ID) and/or learning design is still very new to faculty leading private organisations like KPMG leading the charge in certification/training offerings. Instructional design or learning design is still a new term (and by extension, field) for many faculty members. Many are not aware of the foundational principles associated with instructional and learning theories. However, some private training institutes like KPMG are offering certificate courses in instructional design. There is some hope, though, because top higher education institutions in India are establishing Teaching and Learning Centers along with Educational Technology Centers to provide professional development (PD) for faculty and staff. This has created another segue with masterclasses and panel sessions on AI tools like ChatGPT being organised by professional associations like EdTech Society, where I am the executive director, to help educators in India. These sessions' primary purpose is to help educators better understand the use of AI tools in education, but there is the opportunity to share key concepts of the field here as well.

Another challenge in India is in the rural parts of the country, where there is a lack of proper infrastructure for higher education institutions to support technological learning and delivery as well as the PD opportunities that are associated with it. The government is in the process of implementing a new educational policy to address PD issues with the hope of integrating more evidence-based active learning strategies which are aligned with instructional and learning design principles.

Martin's Voice

Who Am I?

As a Swiss-educated chef by trade, I have spent 20 years of my working life in five-star hotels across five continents. I have been very fortunate to experience and learn from many different cultures, as they influence and shape my view on practice-focused and workplace-informed learning. I was 40 years old when I lost my vision, and this resulted in me being transformed into a vocational education teacher. Since 2005 I've been in Australia, where I have delivered and developed formal Vocational Education and Training (VET) Culinary and Hospitality professional qualifications. Within this ongoing process, I continued my professional educational development and training by completing adult education degrees and certifications. Now, I focus on designing courses and programmes guided by our organisation's strategic framework of Educational Excellence (EdEx), which is founded on the Conceptual Blended Learning Framework (CBLF) model (Zgraggen, 2021, pp. 203–206) in VET hospitality training.

Due to the complexity and size of our organisation, across national and international jurisdictions, blended learning and its approaches are still a very challenging area. In this space, I am a

strong advocate for enabling a blended learning approach by utilising relevant and tested learning technologies. I do this with the view of actually producing fit-for-purpose and industry-informed practices to foster more innovative and student-centric teaching and learning practices.

What's Happening in Australia

So, everyone in the world is discussing how the emergence of AI is going to affect us. The regulators here are having consultations on what policies and procedures should guide the use of AI. This, I think, is a huge challenge because technology evolves faster than people can write policies and procedures. These issues not only influence how the country is doing but also play a big part in my everyday work. I just returned from a conference that was at the international level for education excellence in tourism and hospitality. The conversations, panel of experts, discussions, and presentations across the different educational providers were about the ethical use and integration of AI in the work and in the training space. We know AI is already playing an important role in the work environment, and we need to think about how to integrate these agile and constantly evolving AI-driven technologies into our educational practices. Suggestions include a greater alignment and collaboration between industry and educational organisations, with less governmental red tape. Such suggestions, it is believed, can facilitate and foster a more cohesive approach in (co-)designing and developing bespoke and innovative teaching and learning content and its practices.

A potential AI practice case that was discussed at the conference is the creation of a culinary app for chefs and trainee chefs that is AI-driven, where you could take a picture of your prepared dish and the AI-generated response would give you some feedback. How would this look? How should it look? Should it provide some alternative presentation (plating), suggest suitable ingredients for substitution, and so forth as a self-reflective and “in real-time” learning tool? Lots to think about.

Another issue being discussed is how should we design and write curriculum with a particular focus on meeting regulatory compliance and stakeholder expectations of quality. The task of deciphering and delivering the approved content is still a battle, as the recognition and importance of “learning design” is still not fully viewed as important and appreciated across educational organisations. My last issue is, in my organisation, as we work with multiple learning management systems across several different state and international jurisdictions, I provide as much support and guidance (as an advocate for learning design) as possible to my colleagues as well as an elected VET representative and board members. This kind of support, somewhat like professional development, is still being negotiated in many spaces and is slowly being seen as a significant need.

What I Think the Field of IDT Needs

In my view, the combination of the AI conversation and how it shapes teaching and learning practices is greatly underestimated and misunderstood. However, LMS/LXP providers such as Open-LMS are driving AI-generated technological applications to the forefront in designing and delivering tertiary courses and programmes at scale. They are using AI to automate context and learning-designed content on their platform. For example, the creation and population of AI-generated pictures (content) can be applied within a few seconds across any relevant course or programme LMS shell. Of course, there are still many questions to be raised and answered, including copyright, academic integrity, privacy, equity, and accessibility. But it shows how powerful this AI-driven technology is already and how we can and/or should make the best use of it. And I think automating mundane jobs (tasks) to provide more space and time for human-centric, specific, and interrelated activities is what we need – it's a game changer.

This means that we can probably put the focus back on the human needs, but I see our field going in the opposite direction, not understanding the role of technology. For example, in the hospitality industry in Singapore, we use technology to automate coffee machines. Think about it, the machine didn't replace the person, the person is still there. I think in education we need to refocus on what is important: the learner.

CONCLUSION

Instructional design as a field has masqueraded for decades as an agnostic field. Some have said it's the perfect field for those who never want to grow up and decide on a career because the field can be applied to so many different content areas. The training provided for instructional designers conditions those in the field to think that they can interface with any industry and succeed in any organization. Textbooks and articles are written to condition practitioners that they are to focus on the *design* of instruction as guided by the subject matter experts. In some way there is still truth to this perspective; however, as the voices from this chapter show, there are some distinctions and situational differences depending on the geographical locations and cultural distinctions.

Each voice outlines a context that is geographically different with characteristics that show similarities from a social, economic, and political point of view. All of the stories are told by practitioners who gained their knowledge outside of their own countries and all returned to enhance learning by transferring their knowledge into their native contexts. Most have to work against the existing systems to introduce new knowledge sets whilst being hindered by social and cultural pressures where systemic change may not be welcomed. There are some common threads in these voices. For example, almost all of us are struggling with access. Whether this is differential access by age, race, gender, socio-economic status, or other factors, the gifts of technology are not always, if ever, equally given to people. Simple issues of broadband or even

power availability become significant in the lives of instructional designers. The roles that instructional designers take on across cultures vary distinctly. In some cases, IDs do everything, in others, they are more dependent on SMEs. But as future instructional designers, it is important for you to take into consideration the specific geographic and cultural impacts on your role as an instructional designer. Some voices seem to accept the occurrences of other spaces as what those contexts desired and all had the initial focus on some form of digital learning as a way forward.

The increasing roles of certain technologies: eLearning, LMSs, AI, and the role of future technologies came up over and over again among our global voices. There remain no clear answers to many of the questions that have come up in these culturally diverse contexts about how technology will be used and what impacts it may have on those that engage its use. Instead, we have a varied and textured perspective across these many voices about the *potential* impacts of these technologies on their work, life, and cultures. One thing that is clear, there are geographic places that still are unaware of, or continuing to define for themselves, what this field of IDT is – they use different terms to define the field and create employment criteria that suit their own educational systems. Inclusion and connection are the common thread that all spaces and places experience. How we can connect to one another and how we can better share and collaborate across the field should be of great and ongoing concern for those of us who represent the next generation of instructional design theorists and practitioners.

Summary of Key Principles

1. Different parts of the world reference the field differently. Some call it education technology, some instructional design (i.e., ID), others learning design (i.e., LD), and some don't use a specific name, as it is subsumed into another task or field. It should be known that for this chapter each person references the field based on their own use and geographic location and still it is under the same umbrella of purpose and use.
2. Contexts originate with geographies but should not be limited to just that – they should include all that is used to compare and contrast one's own understanding from that of the description. This means that it may include (but not limited to) individual (person) characteristics, infrastructure, socially constructed mindsets or understandings and much more.
3. Technology in the broad sense of the term, is referenced in terms of understanding how access and use in countries differ from one another. What may seem a pervasive technology in one country may not immediately translate to another country.
4. Countries may not all have English as their first language, and thus translating theories and practices which are primarily in English may not seamlessly work in their contexts.
5. Design-led thinking philosophies vary and may or may not use prescriptive methods within the field. The foundational views are still upheld, but operationalising the views can and should look different.

Application Questions

1. Open a common search engine and in the setting change the country/region to somewhere different from where you are located. Find job descriptions from different countries where the keywords “learning” and “technology” are referenced. If there are other keywords you think may reference this field, please use them. Once you have found job descriptions, review the criteria for the job.
 - a. What do you notice?
 - b. What differences are there by region, type of job, level of education required, etc.?
 - c. What may you conclude about how the field is represented in this part of the world?
2. The World Population Review (<https://worldpopulationreview.com>) collects up-to-date global population data and demographics. The team working with this data is committed to delivering up-to-date information about each and every country, albeit the information shared on the website may have challenges. Using this website as a source,
 - a. Find two countries that you have never visited.
 - b. Review the data for 2015, 2020, and this year.
 - c. Using the search box, search for internet speeds by country and find the two countries that you selected. Review the information on internet speeds.
 - d. Using the search box, search for internet users by country and find the two countries you selected. Review the information on internet users.
 - e. What can you hypothesize about the two countries with respect to how digital learning may occur?
3. You are hired as a consultant to go to a country on a continent to which you have never been. As a consultant, your job responsibility is to help a university set up an instructional design department that will develop online courses.
 - a. What steps will you take to learn the context and the culture in which the university exists?
 - b. How will you ensure that the department is responsive to the context and not a replication of what you know and your way of doing things?
 - c. How will you empower the local staff to design for their context?

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SECTION **VII**

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**How To Get an IDT
Position and Succeed at It**



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Leaving All Doors Open

Career Options for Those Studying Instructional Design and Technology

Alison A. Carr-Chellman

Twenty some years ago, as a graduate student at Indiana University, I watched as many of my colleagues began journeys in a variety of different career directions. I was amazed at how many different possibilities might grow out of the field of instructional design and technology (IDT). I myself had come from industry after a time in PK–12 education. This chapter is a reflection of the wide variety of options that have emerged over the last decades and offers insider ideas for getting some of those positions.

I was a teacher – and am still. As a very young child, probably not more than 7 or 8, I started joining my mother in her kindergarten classrooms, reading books to children, holding hands with the young ones on the playground, teaching through math manipulatives, and even using technology to teach reading (IBM’s *Writing to Read*). Becoming a teacher seemed a natural choice when I found that pre-law wasn’t for me during my undergraduate studies. I had observed teachers all my life. My grandmother was a teacher, my mother was a teacher, both of my sisters were teachers, my father taught at Ohio State’s medical school. It was in my genes.

I stumbled upon instructional design as I sought out master’s programs in New York State, which required a master’s of all teachers within 5 years of their first teaching appointment. I had the good fortune to be recruited by Dr. Phil Doughty and took my first class in Instructional Design, Development and Evaluation (IDD&E) at Syracuse University during the final semester of my undergraduate teaching degree. At that time, Syracuse boasted Drs. Charles Reigeluth, Barbara Grabowski, Phil Doughty, Nick Smith, and Alex Romisowski. It was a powerhouse that I had the amazing opportunity to fall into. I worked my way through my master’s degree by working at a private tutoring company, Sylvan Learning Centers, a division of Kindercare.

I recall specifically from this time going to my first Association of Educational Communications and Technology (AECT) conference as a graduate

student. I can't remember the location, but I do remember the sight of my advisor, Dr. Grabowski, seeing her colleagues from Penn State, her doctoral institution, as we were returning to the conference hotel. The hugs and the joy that group felt in the reunion was palpable. The intellectual challenge of my master's degree was a great match for me, and it didn't take long for me to be pretty sure that a doctorate was in my future. During my last semester, Dr. Reigeluth asked me if I was interested in doctoral study and noted that he thought I'd do well if I chose this pathway. I bundled up his encouragement, and I took it with me to my position as a "learning engineer" (yes, that's really what it said on my business card) at McDonnell Douglas in Denver, Colorado. I took a couple of courses at the University of Colorado at Denver (UC-D) under Drs. David Jonassen and Brent Wilson and met Dr. Ellen Wagner through an International Society of Performance Improvement (ISPI) (then the National Society for Performance Improvement, NSPI) local chapter while in Denver.

Prior to starting my doctoral studies, I had a unique and exceptional set of experiences, from schools to private tutoring to military contracting. My purpose in telling you this personal history is to set the scene for an exploration of different career pathways that are widely available within the field of IDT. This chapter sets out to share some reflections on the career options within our field, pathways I saw my colleagues taking, some I took myself, and some general rules of thumb on ways to pursue your own dream job in this dynamic and exceptional field. This chapter gives an overview of a variety of types of work IDers do in different settings. Other chapters in this text take up topics within specific settings such as health care, business and industry, K–12, military, and higher education. I've organized the chapter by different work contexts and broken down these contexts by different job opportunities in those contexts. I end the chapter with discussions of career advancement, leadership, and good work habits.

PK–12 EDUCATION

Teacher – Most of us are very familiar with this role. Preparation requires an undergraduate degree and licensure, but within the IDT space, those with advanced training, master's, or doctoral degrees can serve as classroom teachers with a special emphasis on how to effectively utilize technology for learning in the PK–12 context. The current teacher pipeline is of grave concern in terms of the lack of people going into classroom service. While salaries may be lower than some other options, the benefits are immense and the direct impact on human learning enormous. Getting a job as a PK–12 teacher is not necessarily difficult at the present moment, though it can be more difficult in certain areas; however, you have to adhere to strict requirements by each state in terms of coursework and ongoing professional development. While it is true that many schools need more special education, science, math, and career and technical teachers, than English, music, art, or early childhood teachers, there remain ample opportunities in all areas when a teaching license is combined with training or a degree in educational technology. This training can also offer opportunities for advancement in PK–12 schools, as discussed next.

Central office in a school – Within schools, there are opportunities to contribute to the general technology use across classrooms at the school level.

Typically, in partnership with the principal of the school, teachers who have strong training in educational technology can often move from a teaching position into a position as a school-level curriculum specialist or technology specialist for the school. In this role, educational technologists offer professional development and training to classroom teachers, make recommendations for technology purchases, consider classroom designs within a pedagogical framework, and engage with other schools within a district and other educational technologists at neighboring schools to coordinate technology uses in classrooms across and between schools. Unique opportunities such as online course sharing can emerge, and often engaging in such collaborations can lead to opportunities at higher levels within a district.

Central office – School leaders may find themselves tapped for opportunities in a district central office. Instructional designers and educational technologists, particularly those with rich practical experiences coupled with upper-level training (master's or doctoral degrees) give entrée to opportunities such as curriculum developers, assistant superintendents, of technology, or learning specialists of several different kinds. Different districts have very different titles for these positions, and each district will have its own culture. In these positions you might set strategy for technology across a district, you could be involved in school improvement initiatives, you might help determine which learning management system the district should adopt, help work through the budgetary implications, and train the faculty, staff, and students in the use of a new system. These positions are admittedly difficult to obtain, as most districts only have one, or in larger districts two, positions with these specific concerns. They typically go to very well-established professionals who have had experience in the classroom and individual school levels and have proven themselves across the district or have served another district in this or a similar role in the past. To gain access to these positions, you need to not only attain high levels of education, typically at the doctoral level, but also establish your overall reputation as a consummate professional who has demonstrated success and can point to specific achievements in the deployment of technology for learning.

Policy work at state or federal level – Rarely an opportunity arises at the state or federal level to serve as an educational technologist to impact policies that impact districts across systems, regions, and states. Depending on the level, these positions are reserved for highly educated professionals with state, national, or international reputations. These reputations are typically earned through a combination of high-profile projects that have enjoyed public success as well as scholarly and research work which has undergone the rigors of peer review and demonstrate high-caliber inquiry that has applicability to front-line practice. While these jobs often go to people with a degree in educational policy and also quite often to people who have made their careers in public policy, there are opportunities for those with expertise in the uses of technology for human learning to gain access to this kind of policy work.

HIGHER EDUCATION

Faculty – Many of us seek out doctoral study specifically in order to work as faculty members in higher education. While the salaries in higher education are typically lower than those in industry, opportunities to direct one's own

research interests, flexible schedules, and intellectual engagement often outweigh the salary considerations. Faculty opportunities come in several flavors.

Tenure track faculty appointments are often the most sought after. Tenure line positions are considered “up or out” appointments in which one earns “tenure” after typically 5–6 years of service based on a record of teaching, scholarship, and service. The tenure line faculty member is expected to be excellent at all three of these primary job duties and is judged by colleagues in a process that can be stressful and demanding. However, the reward of gaining tenure includes the ability to have an appointment that is relatively protected from backlash against freedom of speech in one’s work. That is, tenure protects its recipient from being fired for saying or writing something negative about, say, the governor in a state. Some people see tenure as a “job for life.” This is not the case. Tenured faculty members, just like employees in corporate, PK–12, or other contexts can lose their jobs “for cause,” meaning the employee isn’t doing their job well or has committed some wrongdoing such as conducting some illegal activity. A tenured faculty member may also lose their job if their program is discontinued due to lack of market demand or university fiscal exigency (bad financial times). Faculty positions are often still seen as a plum job due to the flexibility and most importantly the ability to move the field ahead by pursuing your own scholarly agenda, working with bright students in one’s teaching, and serving the institution and the field often in ways that match with personal missions and goals.

Professional faculty appointments, also known as non-tenure track appointments, are faculty lines that are not centered on the tenure process. These jobs typically ask the faculty member to focus on teaching or service or even external contracting and generally don’t emphasize research as a critical part of the job duties. Professional faculty are not in an “up or out” situation, and in many cases professional faculty appointments are even more secure than tenure line positions because their reviews are more flexible and can be based on the strengths of the candidate’s performance rather than a more unidimensional focus on scholarship as the litmus test, which is often the case with tenure line faculty, particularly at R1 (high research) universities. Professional faculty typically also enjoy high degrees of flexibility and respect for their expertise. There has been an unfortunate history of less status for professional faculty among university colleagues, and this has too often been less than humane. Career tracks for professional faculty are still developing in universities nationwide. Professional faculty are frequently asked to focus on professional practices which can be illuminated by professional associations who define areas of practice. In universities that are appropriately treating their professional faculty, there is a clear focus on what the faculty members (professional, tenure line, or adjunct) are hired for, and the criteria for evaluation are aligned to those job duties and expectations. Professional faculty lines are typically still quite difficult to attain (though in some cases not as difficult as tenure line) and usually require extensive experience in the practice of the field they’re hired for. Teaching experiences are typically heavily counted in evaluating candidates for professional faculty positions.

Adjunct faculty are typically hired for very specific tasks. These are usually not considered full time positions. In Colleges and Schools of Education, in particular, these faculty are often employed full time in local area schools or other areas of practice nationally with remote work for online programs.

Adjuncts are often paid “piece meal” or by the course. The pay is low, and often new scholars seek out many sections of courses across multiple universities to piece together a full-time position or at least full-time equivalent pay. Adjuncts represent a very flexible workforce for universities, and accreditors also sometimes require the presence of practitioners in classrooms, and adjuncts work very well for these purposes. However, the “adjunctification” of university labor (Alexander, 2020) from tenure line or professional faculty to contingent workers creates a great deal of stress on those serving in adjunct positions when that is the only income or career they have. Adjunct appointments are relatively easy to get, and given their low income and tenuous status, this is not surprising. Teaching as an adjunct can be a positive experience (Cherwin, 2010), and for some it’s a perfect match particularly for those who wish to pursue other goals, prefer remote work, or wish to expand their existing practice by teaching for a university. However, the adjunctification of higher education should be considered carefully, used with caution for appropriate and not purely financial concerns, and increasingly considered from within a humane framework.

Staff appointments are widely available in higher education with opportunities in online, instructional design, curriculum, teaching and learning, professional development for faculty, course design, and more. Staff appointments in universities for IDers tend to be both very good opportunities and quite stable. While these positions are not typically focused on research and don’t involve teaching or mentoring graduate students, some staff appointments do include a faculty line as part of the appointment and ask the staff member to conduct some research and work with students on occasion. These appointments often have good career ladders that can lead to vice presidencies. Some staff appointments are exclusively in university-run research institutes and expect a great deal of research productivity. The staff appointments in universities really run the gamut in terms of different kinds of appointments, how hard they are to obtain, how much respect or power they command, and salaries. There are a large variety of such positions, some require a master’s degree, others need doctoral degrees to attain. It is unusual, but does happen, that a person with an undergraduate degree in communications or education would be placed in a staff appointment. Higher education as an enterprise and culture does value advanced educational credentials, so you’ll find that while you may be able to get an entry-level position with an undergraduate degree, it will often take additional degrees to advance in your career, especially in higher education.

BUSINESS AND INDUSTRY

General HRD/corporate training – There are a large number of opportunities to design instruction and training for a general corporate audience. From kiosk-driven training for used-car dealerships to advanced leadership academies for C suite executives, the need for strong “educationists” who understand learning theories, applications of technology to human learning, and return on investment for training remain in high demand. The Bureau of Labor Statistics has continued its optimistic job prospects for instructional designers, indicating an 11% growth in the near term with a 7% increase in salaries (University of Chicago, 2023). ID jobs in the corporate sector can range from

“ID sweat shops” where IDers spend long days and months writing learning objectives and matched test items for large training programs, to creative and innovative opportunities to work on a variety of projects from start to finish (analysis to evaluation). IDers in corporate settings typically work on teams with other specialized professionals, such as graphic designers, programmers, production assistants, and subject matter experts (SMEs). IDers are generally promoted more quickly if they have a master’s or doctoral degree in the field, particularly where technology integration is a critical element of the work.

Specialized training contexts – There are some specialized contexts where ID takes place within corporate training. Included among these is high-risk training, such as firefighters, high-stakes medical training, jet fighter pilots, and so forth. Some of these jobs are within governmental agencies, some of them are within military or governmental contractors. Another specialized training context is the adult learning space, which might include professional development programs or adult basic education centers. In general, these positions vary widely in terms of availability, salaries, and qualifications. Such jobs are often found on job boards or outlets such as Indeed or LinkedIn.

NON-PROFITS/NON-GOVERNMENTAL ORGANIZATIONS (NGOS)

There are a number of foundations, associations, and organizations that use IDT workers to help with learning and technology needs across their portfolio. In some cases, non-profits need help in educating their constituents, such as when an IDer is needed to educate foster parents in their role as caregivers, or the Red Cross or American Heart Association is looking for assistance in preparing training for first responders or for public health. Other non-profits are in need of IDers internally, such as when a hospital or foundation may need assistance preparing materials for their workers to learn about policies, operations, the mission, and other required trainings, such as for diversity and legal or budget compliance. These jobs are quite varied in terms of qualifications (many will be happy to find a less expensive designer who has no graduate training), pay, and availability.

Among non-profits, there tends to be a stronger focus on collaboration among groups as well as creating learning communities and utilizing technology to increase interactivity. While good instructional design practice generally attends to collaboration, group work, learning communities, and interactivity, it is even more important within the culture of non-profits and NGOs, as it is aligned with their culture and missions. Recent work for NGOs has been centering on human rights, such as Halo’s programs to de-mine war-torn territories. Training needs may include volunteers and full-time employees in these types of jobs.

RESEARCH CENTERS

One of my colleagues from graduate school went to work for a regional research center directly out of his doctorate. There is a network of 10 regional educational research centers across the U.S. (<https://ies.ed.gov/ncee/edlabs/regions/>) run by the Institute of Educational Sciences, an arm

of the U.S. Department of Education. This is one example of the research centers funded by federal, state, and local governments or through a wide variety of foundations. IDers, particularly those with master's level training, may be asked to create training and professional development for employees of the research centers or their contractors. Those with doctoral training may be engaged to take on large research projects across the U.S. in the education sector. These can range from understanding the impacts of current events (such as trauma, health crises, and environmental impacts) on student learning to student outcomes metrics (designing, measuring, and analyzing data), to investigating student success measures across diverse populations. The regional labs work within the PK–12 context primarily, but not exclusively, while foundations have a particular interest in research within their mission and scope and can overlap appreciably with non-profit work. Research labs can also be engaged in scientific and high-tech research on things like uses of artificial intelligence, virtual reality, or artificial reality in human learning, sponsored by a wide variety of high-tech organizations such as NASA. Jobs in these research labs tend to be reserved for those who have doctoral degrees and demonstrated research expertise. Such positions are generally well-funded with good salaries that rival or exceed those in higher education but generally fall short of corporate work. Research lab work is a mixed opportunity to engage in research that will make a difference to society, but not to entirely direct your own research trajectory as you would in higher education.

CONSULTING GIGS

Throughout my career I have continued to consult as an IDer on a wide variety of projects, from pharmaceutical employee training to helping think through an early childhood game to help young children learn to handle emotions. My experience of these part-time consulting opportunities has been that they are exceedingly valuable in maintaining my skills as an IDer and bring me into contact with a network that may be useful later as I seek out opportunities to sit on paid boards related to educational technology companies. Some of my doctoral student colleagues found the consulting operation of their own ID practice to be a fantastic alternative to the traditional PK–12, corporate, non-profit, or higher education contexts. Much like a physician in private practice, IDers who choose to consult have a great deal of freedom in what projects they select, or at least to the extent that they can *afford* to be selective. Consultants can choose what they want to focus on because there are so many opportunities to play with different projects in different contexts that they are able to apply their design expertise to a wide variety of projects. These positions are largely self-made. Successful consultants are highly entrepreneurial and have strong business acumen in addition to excellent design skills. They have strong communication and marketing abilities and are self-disciplined in order to deliver results under budget and on time. Consulting can be a fantastic career choice, though it usually is for those who have had some successful prior experience in the field and are prepared for the ups and downs of working with sometimes demanding clients. As experiences in consulting are collected, the consultant has the unique opportunity to slowly direct their careers toward the kind of

work that they enjoy most (be it design, training, marketing, supervision, technology use, organizational improvement, etc.).

CAREER ADVANCEMENT

Once you land the job of your dreams and you've done that job for several years, you may be looking to move up. This is a normal process. In higher education, the system has already set up a ladder for faculty advancement, but in many other contexts, like corporate training or consulting, it may not be evident how you could advance your career and move into the next step up in order to diversify your daily work; keep engaged; and increase your salary, responsibilities, and power in an organization. In some cases, additional training, graduate programming, or certifications may be a good launching pad to move to the next level. There are ample opportunities throughout your daily life to consider additional professional development, from in-house opportunities to LinkedIn or Coursera certifications or brand name university executive academies. Learning something new not only qualifies you for advancement, but it keeps you engaged in the current trends in the field. In addition to continuing education or professional development, advancement often comes to those who do excellent work and are politically savvy (see the following work habits section). Opportunities abound in all of the previously mentioned areas for advancement, be it moving into program/department/college/university administration and leadership, lead ID for a corporate setting, or leadership of design functions for a non-profit, there are many chances to advance, and most of them involve leadership. As an IDer you would be in a leadership position just on the design team, as is most commonly the case (see the next section). Advancement in the field comes to those who continuously improve and learn and those who distinguish themselves as innovative, creative, and entrepreneurial designers.

LEADERSHIP

No discussion of ID work opportunities would be complete without consideration of leadership basics. As mentioned earlier, IDers are prepared to serve as leaders, and they often find themselves in the center of a spoked wheel that includes graphic designers, SMEs, technical writers, programmers, and more. The nature of the designer as a central actor in that team tends to create increased reliance on the IDer for coordination and collaboration among team members, visioning, agenda setting – in short, leadership. Leadership tasks naturally fall to the IDer. Because of this, a few notes on leadership are worth sharing here. My experience as a leader informs these notes, but please know that there are entire degree programs on the study of leadership; many, many books written on the topic; movies that demonstrate these principles; and people with different experiences from mine who would give different advice. That said, here are a few basics that I think are worth IDers tucking away for a time when they need them:

- Leaders need a high level of emotional intelligence.
- Leaders must lead by example, setting the example for those they lead to emulate.

- Leadership is not about power, it's about empowering others. If you're in it for the power you'll inevitably fail.
- Leaders should not take unilateral action, stakeholders need to weigh in and leaders need to listen in a way that feedback actually impacts outcomes.
- Leadership is hard, please do not approach it without this realization, you will have to do hard things and have a thick skin in order to effectively lead.
- Leaders are not the focus, in fact, the Marianists (the Catholic order that runs my university) have written that "the best superior is the one who makes his superiority the least felt" (Marianists, 2013, p. 12).
- Transparency is essential, share as much as you can possibly share. Information is only powerful when shared broadly and becomes poisonous when hoarded or leveraged.
- Listening is essential, and so is talking. You'll hear that good leaders don't talk too much, and in part that's true, but honestly sharing is as important as listening and acting on what you hear as a leader.
- Professional development of your people is necessary to demonstrate you sincerely care about the people in your organization.
- Self-care is needed for any leader. If you can't take care of yourself, you're no good to take care of others, and they can't trust you to take care of them or lead because you don't know how to care for yourself.
- You may have to demonstrate high degrees of flexibility; do not commit to something that you can't back down from if you find that it would be bad for your people or your organization.
- Hiring, promoting, and developing people is among the most important things leaders and supervisors do; take it seriously, invest in it, and do it carefully.
- When you hit challenges and obstacles, dig deep and engage your perseverance, grit, and persistence.
- Inspire, connect, and have fun. People like to work in workplaces that are enjoyable, psychologically safe, and where they feel cared for. They also like to work in a place that they believe is making the world a better place in one way or another. Create that place.

GOOD WORK HABITS

There are some basic things I've learned in my years working as a teacher, leader, designer, author, speaker, and follower. These ideas are just basic good work habits and again are drawn from my experiences. Others would have a different set of habits that they would highlight, but these are some simple rules of thumb that you can follow to help you get ahead in your career no matter what context or role you may take on.

- Do your job. This is an obvious good work habit, but so many forget what it is that they were hired to do and they get lost in other things that are not about their jobs. A first step in good work is doing what is asked and doing it well. Sometimes going above and beyond is a great thing, sometimes it can be perceived as doing something you weren't asked for, so go for excellence in your work and focus on the job in front of

- you. This will make those who hired you very happy. Don't gossip, take too many breaks, play games, shop online, or scroll on social media endlessly if you want to be seen as doing your job.
- Reach out. Get connected with those around you in positive ways. Learn about the organization, its culture, and its history by connecting with others who have more history. Ask good questions and engage your co-workers, boss, those who work with you and deliver parts of your project, and those who support your work (they can make or break you).
 - Show up. Be serious in your work, and earnest as well as enthusiastic. People like positivity and commitment to do the work and do it well. Be present, leave your door open, attend work functions (even if they are after hours) whenever you can.
 - Say "yes." Whatever the request is, if you believe you can do it, even if it will stretch you, even if it will make your job more demanding, say yes. Doing so will demonstrate to others that you are reliable, capable, willing, and the next time they have a project they will come back to you, giving you more opportunities to say yes. This is a virtuous circle.
 - Don't gripe about small stuff. If there's no stapler at your office and the requisition seems to be taking months, grab one at the office supply store, put your name on the bottom (not the top) of the stapler and take it to the office. Don't complain loudly about how unfair it is that no one provided you the tools you need to do your job, at least not about a stapler. There are and will definitely be important times to complain about the conditions of your work, but try to reserve the complaints for the big stuff.
 - Take a systems view. Speaking of big stuff, always be thinking about the broader concerns of your work. Think not only of your specific project but how that project fits into the larger issues of your organization. Think broadly and look for ways that you can work with the interconnections and interdependencies of your workplace to improve the overall organizational effectiveness. Think carefully about suggestions you make to anticipate unanticipated outcomes. Look a few steps ahead, like chess champions do. Think strategically.
 - Know your limits. Depending on where you are in your career, there are probably people who know more than you about things. Don't approach people with a know-it-all attitude, it's unlikely that you know something that they don't already know or haven't already thought about. And even if you do, it won't make you particularly popular to point it out. We all want to assert our expertise, it's what makes us feel useful, but be judicious in this; if you are, you'll carry gravitas with your words when you use them.
 - Respect power. While we might all like to be entirely in charge of our own work lives, it is rarely that case that anyone is above accountability to *someone*. There's always a boss, and there is always power in all organizations that flows in different ways. Observe that power and understand that it is not viewed well to ignore, usurp, or complain about power. Question wisely.
 - Be self-aware. Accept feedback gently and graciously, be aware of your own limitations and your strengths. Share the positives you accomplish with humility, but be sure that people know about the good work you

do. “Of me I sing” is not a bad thing when approached with care and balance. When you get negative feedback, look honestly at it and use it to improve your work.

- Respect staff, whether it is a staff in your own department, in others, or even in other organizations, like at your doctor’s office or the DMV. Staff have really hard jobs, and they are generally lovely people who are simply trying to help. Getting angry with them because they are the first-line people happens to them all day long. But if you want to get things done, and if you want to be a good human being, you should practice kindness with all staff.
- Work hard. My husband has a motto that I think about each morning: find the biggest rock you can and carry it as far as you can by the end of the day. This is sort of the opposite of quiet quitting. I am not encouraging workaholicism here, but you will also see that if you work hard and others see you honestly working hard, assuming your work is good, and you don’t get mixed up in some politics, you’ll advance easily.
- Make time for what matters. Whether you reserve time for deep work or arrange your schedule for focused time every day, it is important that you take stock of your work and make sure you are making progress on things that really matter. This helps you feel like your work is important and worth doing every day and will lead to you loving your job. It also helps your boss and co-workers see that you are able to prioritize and do good work that is meaningful.
- Structure and schedule. Be sure that you work to create structures in your work that give you a predictable and regular schedule that you can use to work in all the tasks you hope for each day, including time with family, writing, exercise, prayer/reflection/meditation, emotional therapy, and self-care.
- Trust and delegate. You simply can’t do it all, and as you move up in an organization you’ll find that even more. Find and hire people you can trust and delegate to them without second guessing their work.

One final word of encouragement. This field of IDT is an amazing opportunity to change the world of human learning. You have in your hands and head the potential for an amazing career, and those of us who have gone before you into the field of IDT are sure you can create fantastic opportunities. Have fun, enjoy the ride, and make the world a better place.

Summary of Key Principles

1. Instructional design is a field with many possible career opportunities across contexts such as PK–12, higher education, business and industry, non-profits/non-governmental organizations, research institutes, and private consulting.
2. These opportunities are readily available for those with proper preparation and an interest in specific contexts.
3. Career ladders are readily available across these contexts for those with leadership potential and ID/learning technology training and skills.
4. Leadership and good work habits are essential for career advancement.

Application Questions

1. Take a reflective moment to consider the types of opportunities for different contexts and jobs that you might choose after you complete your degree in IDT. Identify the top three jobs with as much detail as possible . . . what would your dream job look like?
2. Based on your dream job (your top choice for the previous question), lay out a plan for reaching that goal. Your plan might include your educational plan to achieve your degree, but also experiences (internships, volunteer, or pro bono work on ID projects, pain experiences, etc.) that you might also get to attain your dream job.
3. Look forward 5 years and identify where you are in your career at that moment. Identify what professional development organizations you might join or other experiences you might engage to create a professional development plan for yourself for the next 5 years to reach your goal. You may want to consider doing this for 10 years as well.

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Getting an Instructional Design Position

Lessons From a Personal History

Robert A. Reiser

The purpose of this chapter is to describe some lessons that I learned when I was looking for my first position in the field of instructional design. By describing these lessons, I hope to provide some useful information to those of you interested in obtaining an instructional design position.

Because I am in an instructional design frame of mind, I will now restate the purpose of my chapter in terms that should please those of you who are firm believers in “traditional” instructional design practices (tongue-in-cheek note to constructivists – please do not read the remainder of this paragraph; you may find it offensive). The objectives of this chapter are as follows: Given a copy of this chapter, the reader will read it and:

1. choose to apply the lessons described herein, and
2. obtain a desirable position in the field of instructional design.

Before I begin to describe the lessons I learned, I would like to briefly describe some of the conditions under which I learned them. First, I learned the lessons back in pre-historic days, in 1975 to be exact. As many people are fond of saying, “times were different then,” but the times weren’t all that different! Second, at the time I learned these lessons, I was looking for a faculty position in academia. Although a few of the lessons may apply primarily to those individuals looking for a similar position, I believe most of the lessons apply regardless of the type of instructional design position you are seeking. Third, I learned many of these lessons when I was a doctoral student. Some of the lessons I will describe may be geared toward doctoral students, but I think most of them should be of value to anyone interested in obtaining a position in our field.

Now that I have masterfully handled any concerns you may have had about the external validity of my findings, let me take you back to those thrilling days of yesteryear . . . the lowly graduate student (me) plods along again!

THE JOURNEY BEGINS

In the first half of the 1970s, a frequently used expression was “the light at the end of the tunnel,” and in January 1975 I finally began to see that light. I realized that within a few months I would most likely graduate from Arizona State University’s doctoral program in instructional design. At that point, I decided I should start looking for a position I could move into upon my graduation. Thus began my job search.

The first source I turned to during my search was the loose-leaf job book (these were pre-internet times) that was maintained and updated by the faculty members in my doctoral program. As I looked through that job book, I was reminded of a song that was popular back then, “Is That All There Is?” Needless to say, the number of faculty positions in academia listed in the job book was considerably less than I had expected. Thus I decided to turn to other sources in order to find out about position openings. This leads me to the first lesson:

Lesson #1: Use a Wide Variety of Sources to Find Out About Instructional Design Job Openings

In today’s world, job seekers often turn to the internet to find out about jobs that are available in their field of interest, and doing so should be one of the primary strategies you employ as you seek a position in the field of instructional design. Popular job search websites such as Indeed, Monster, LinkedIn, Glassdoor, and many others often list hundreds of instructional design positions that are available in a wide variety of types of organizations, including large and small businesses and institutions of higher education. Many instructional design positions in higher education, faculty positions, as well as administrative and staff openings, can also be found at jobs.chronicle.com, the job search website maintained by *The Chronicle of Higher Education*. Federal government positions in instructional design can be found online by visiting USAjobs.gov.

Job openings are also listed on the websites of several of the professional associations affiliated with the field of instructional design, such as ATD (Association for Talent Development), the Learning Guild, and AECT (Association for Educational Communications and Technology); the latter particularly for academic positions. In addition, almost all of these associations operate *career centers* at their annual conferences. Career centers at conferences provide organizations with the opportunity to post jobs that are currently available, enable job seekers to post their resumes, and provide meeting areas where job interviews and informal discussions about job opportunities can take place. Many professional organizations offer these career center services year-round, with much of the activity taking place online.

The faculty members in your academic program are also excellent sources of information about job openings. They often will receive information about job openings from their colleagues at other institutions, as well as from program alumni and professional acquaintances. Thus it is often wise to ask your faculty members about the job opportunities they may be aware of. Later in this chapter I will discuss some related ideas about having job discussions with your professors.

As should be obvious by now, most of the sources of information about jobs I have mentioned so far are accessed via the internet, but as I mentioned, back in the days when I was job hunting there was no internet. However, contrary to some of the rumors you may have heard, at the time I was looking for a job the printing press had indeed been invented! Thus I was able to review the openings listed in various professional journals and posted at professional meetings, and as I looked through those job listings, I learned several useful lessons.

Lesson #2: Most Instructional Design Positions Are in Business and Industry

Although this lesson was a bit surprising to me back in 1975, it shouldn't be surprising to anyone today. While the number of instructional design positions in higher education has greatly expanded in recent years (Decherney & Levander, 2020), the majority of positions in the field of instructional design are in business and industry (Peck, 2023). And this was even more the case when I was seeking a position. Thus I found Lesson #2 to be a bit disheartening. It was not as disheartening, however, as the next lesson I learned.

Lesson #3 (Also Known as “The Faculty Members’ Lament”): Most High-Paying Instructional Design Positions Are in Business and Industry

This lesson still holds true today. Many of the master's-level graduates of the instructional design program where I worked (Florida State University) began their careers in business and industry at salaries that are comparable to those of new faculty members with doctoral degrees. Average annual salaries for instructional designers working in business and industry can be found in a variety of online sources, such as Glassdoor and ZipRecruiter.

Lesson #4: Learn How Businesses Operate

In light of lessons #2 and #3, you may decide that a job in business and industry is in your best interest. If that is the case, it is important that you acquire a clear understanding of how businesses operate. At Florida State, many students have acquired this knowledge by taking a graduate-level business and management course, such as Organizational Development, offered by the College of Business. A similar course at your university should prepare you to better understand the business environment in which you may be working.

Lesson #5: Acquire a Strong Set of Technology Skills

As I proceeded through the listings of job openings, I also noticed that many prospective employers were looking for instructional designers with a strong set of technology skills. Today this situation exists to an even greater degree. Over the years, the technologies that are frequently used to deliver instruction have changed (is it really true that the slide-tape presentations are no longer in high demand?), but organizations are still seeking to hire instructional designers who possess a strong set of technology skills, especially in such areas as

e-learning and multimedia production. Most programs in our field offer a wide variety of courses that focus on such skills. My advice is to take several such courses.

Unfortunately, when I was a graduate student, I did not take many technology-related courses, and I believe that my lack of skills in that area worked against me when I was being considered for several of the positions I applied for. Fortunately, the instructional design skills and experience I acquired while I was a student and graduate assistant at Arizona State did help me get several job interviews. This leads me to the next lesson.

Lesson #6: Acquire a Strong Set of Design (and Analysis!) Skills

I believe lessons #5 and #6 go hand in hand. Although technology skills are likely to help you acquire a job, I believe it is essential to have a strong set of design skills, ranging from being able to describe goals and objectives, all the way through to being able to conduct formative evaluations and revise instruction based upon the data that is collected. Moreover, I believe it is also important to have a strong set of analysis skills, including skills in the areas of needs assessment, job task analysis, and instructional analysis.

Speaking of analysis, if your analysis of the skills you have (or don't have!) has led you to be concerned about the type of position you will be qualified for, let me assuage your fears – don't worry, you'll manage. And you can take the last part of the preceding statement quite literally. As was the case when I was looking for a position, many current job announcements call for skills in the management of instructional design projects. So, we come to the next lesson.

Lesson #7: Acquire Some Management Skills

Many graduates of instructional design programs have indicated that shortly after they obtain a position, they are thrust into some type of management role. Many graduate programs in our field offer courses and/or experiences in this area, and I believe it is to your definite advantage to gain some skills and experience in the management of instructional projects and personnel.

Lesson # 8: Develop a Strong Set of Communication Skills

To be an effective instructional designer or manager, you need to be able to clearly communicate with others, both in your written work and in your oral communication. Moreover, you need to be a good listener; you need to be able to clearly understand what subject matter experts and other members of a design team are stating. Oftentimes, in order to do so, you will need to ask questions that will help clarify points that are not clear. You also need to be a good note-taker. As I have discovered, and as many of my former students have confirmed, these communication skills are essential to success in our field.

Of course, being a good communicator is also a vital skill during your job search. As I began applying for positions, I tried to use my writing ability to prepare letters of inquiry that I felt would result in my being selected as a strong candidate for at least some of those positions. Working away at the old

typewriter (this was during the pre-word-processing age), I sent off many letters of inquiry. And before I knew it, I received my first reply, which leads me to the next lesson.

Lesson #9: Don't Be Discouraged If You Don't Get the First Job You Apply For

As you can tell from this lesson, I did not get the first job I applied for. Unfortunately, the same thing is likely to happen to you, so be prepared for it! With this piece of advice in mind, instead of dwelling on the rejection letter I had received, I waited eagerly for a response from the second potential employer I wrote to. And before I knew it, it came. And with that response, came the next lesson.

Lesson #10: Don't Be Discouraged If You Don't Get the Second Job You Apply For

I could go on listing many similar lessons, but rather than dwelling on misfortune, let's just say I had a long string of bad luck. But my luck finally changed, and it did so when I joined the Association for Educational Communications and Technology (AECT). This leads me to the next two lessons.

Lesson #11: Join One or More Professional Organizations

Joining a professional association was one of the most important steps I took early in my career. Doing so, and then attending the annual AECT conference, gave me the opportunity to meet many other people in the field, including students and faculty in other academic programs and many instructional design professionals working in other settings (e.g., business and industry, government, K–12 education, the military). Thus, without even realizing it, I started establishing a network of professional acquaintances who would help me grow professionally throughout my career. And I am confident that the same thing can happen to you if, as a starter, you join a professional association, especially if you do so when near the start of your career, when you are still a student (joining now will get you on the right path sooner, not to mention the fact that membership rates are lower for students!).

Which associations should you join? I often recommend that students seeking jobs in higher education join AECT and those seeking jobs in business and industry join ATD. However, talk to the professors in your program about your professional goals and get their opinions as to which associations they think are well-suited for you. Then go ahead and join one or two and proceed to the next lesson.

Lesson #12: Become Active in One or More Professional Organizations

After I joined AECT, I attended their annual conference, which was held in Dallas that year. During the conference, I registered with the job placement service, gave several paper presentations, spoke with faculty from several universities (in spite of the fact that my professors kept trying to keep me

hidden), and volunteered to work on a committee of one of the subgroups within AECT. In other words, in today's parlance, I kept a high profile. And for once in my life, my profile (no, I am not talking my handsome countenance), paid off; being active at the conference helped me get invited to two universities for job interviews.

So, how can you become active within a professional association? One of the ways you can do so is by delivering one or more presentations at the annual conference. Many months prior to its annual conference, an organization will send out a message to all of its members, inviting them to submit proposals to deliver presentations at the conference. When you receive such a request, don't be shy; go ahead and submit a proposal, perhaps teaming up with a fellow student or one of your professors in order to do so (working with others on such tasks is often a good idea; it provides you the opportunity to share ideas and responsibilities; but be sure to work with someone who takes his or her responsibilities seriously!).

A second good way to become active in a professional association is to volunteer to do some work for a subgroup (often called a *division or special interest group*), within the organization. How do you begin? I suggest that when you attend a conference, that you attend the business meetings of several subgroups that are of interest to you. The dates and times of these business meetings, which typically last for about sixty to ninety minutes, usually are listed in the conference program and are open to everyone. When you attend one of these meetings you are likely to hear of some the activities that particular subgroup is planning. If the activity sounds even somewhat interesting to you, volunteer to help (in my case, I volunteered to organize an awards program within one of the AECT divisions). Then do a good job. When you do so, colleagues within the organization will recognize it and start respecting your initiative and your abilities. You will then be well on your way to moving on to better things. As indicated earlier, my initial involvement in AECT led to two job interviews, and my continued involvement in the organization throughout my professional life has furthered my career in ways too numerous to mention.

Although my activities at the AECT conference led to invitations to two university job interviews, there was another contributing factor as well. By the time I attended the convention, several manuscripts I had written for class assignments or co-authored for research projects had been approved as conference presentations or were accepted for publication in a journal. Because I was seeking a position in the world of "publish or perish," my presentation and publication record did not go unnoticed. Thus my next lesson.

Lesson #13: Publish, Don't Cherish

The dictionary indicates that cherish means "to cling fondly to something." Instead of clinging to (or flinging out) the papers and reports you have written for classes or projects, my suggestion is to submit them to be presented at conferences and/or to be considered for publication in a professional journal.

To which journals should you submit your papers and reports? A large number of online sources list the major journals in the field. Review the types of articles found in those publications and submit your manuscripts to the journals for which they seem best suited. Because I am a strong believer in

practicing what I preach, I would like to point out that I have submitted manuscripts to many of the journals in the field. Notice, however, that I used the words *submitted to*, not *published in*. On rare (well, maybe not so rare!) occasions, my manuscripts have been rejected – which leads me to the next lesson.

Lesson #14: Don't Be Dejected If Your Manuscript Is Rejected

Even if your manuscript is rejected, you are likely to get some valuable feedback from those who reviewed it. If the feedback indicates that the manuscript has some redeeming qualities, I suggest that you use the feedback to revise your manuscript. After you do so, submit the revised manuscript to another journal, or perhaps resubmit it to the same journal. If you follow this strategy it is likely that your manuscript eventually will be published, but don't be surprised if you receive some more rejection notices first!

Speaking of rejection, let me get back to my story. When we last left me, I was about to go off to job interviews at two universities. The first of these interviews was at the University of Toledo. I mention the name of that university for two reasons. First, it is to point out that when I told my wife that I was to be interviewed there, her only reply was "Holy Toledo!" Second, it is to turn your attention to the next lesson.

Lesson #15: Develop an Area of Expertise

Oftentimes, organizations seeking to hire an instructional designer are looking for someone who has some expertise in a particular area within our field. Such was the case at the University of Toledo in the mid-1970s. At that time the College of Education at Toledo was in the midst of developing and implementing a competency-based teacher education program. Fortunately for me, competency-based instruction was an area in which I had developed a good deal of competency! Indeed, during the time I had been a graduate student at Arizona State I had worked with a faculty member in designing a course on competency-based instruction and I had taught the course several times. I had also delivered a conference paper describing my work in that area and had assisted two of my professors on an early draft of what would eventually become a popular textbook on the topic (i.e., Sullivan & Higgins, 1983). Thus, for someone who was still in graduate school, I had developed a good deal of expertise in the area of competency-based instruction. Having that expertise certainly was a major factor in my being called in for an interview at a university seeking help in the development of a competency-based program.

The lesson to be learned here is that by developing an area of expertise while you are a student, you are likely to increase your chances of standing out from the rest of the crowd when you apply for certain jobs. Of course, it is important that the area of expertise that you decide to develop is one that is likely to be in high demand within our field for many years to come. Moreover, it is important that while you are developing your expertise in that area, you produce some tangible evidence (such as instructional materials you develop, courses you teach, and papers you present) that demonstrate your skill and experience. My vita provided such evidence and was clearly a factor

in my being invited to the University of Toledo to interview for the position. My experience during that interview leads me to my next lesson.

Lesson #16: When Preparing for a Job Interview, Find Out as Much as You Can About Your Potential Employers

I remember my interview at University of Toledo quite clearly. Everyone I met there was very nice, and many of them were very interested in me and my work. One faculty member, let's call him Professor X, was particularly interested in one area in which I had professed some expertise (although I don't recall the area, let's say it was mastery learning). Indeed, Professor X himself had done some research in that area, and he asked me if I had read an article he had recently written about the topic. I responded by indicating that I had not read his paper. "Well," he said, "have you read Jones's outstanding literature review on mastery learning?" Again, I had to respond that I had not read the paper he was referring to. The conversation continued to proceed in this fashion and, as it did, I became more and more certain that I would not get the job. For once, I was right: I didn't get the job, but I did learn that when an organization invites you to participate in a job interview it is important to find out as much as you can about that organization and the people you are likely to be meeting with.

If it is unclear as to who you will be meeting with, ask the person who has contacted you to send you an interview schedule (they are likely to do so anyhow). This schedule is likely to contain the names of some of the people you will be meeting with (e.g., the name of a department head), and will also list the groups with whom you will be meeting (e.g., "meet with the search committee"). In the latter case, you may need to do some detective work to figure out who is a member of particular group. In many cases, it may well be worth it to do so!

If I had taken the time to find out more about the interests and expertise of the faculty members at the University of Toledo, I most likely would have discovered that Professor X was interested in a topic area in which I was interested. By taking time before the interview to look at his work in that area, I would have been well-prepared to mention and discuss his work before he questioned me. I'm sure that would have created a much better impression of me than the one he had of me after my interview. You can learn from my mistake by taking some time to find out about your potential employers. Then, during the interview you will be able to demonstrate that you know a good bit about them and their organization. These actions will not only increase the chances that you will get the job for which you are interviewing but will also increase your knowledge about the organization. That way you can decide whether you want to work there or at one of the many other places craving to hire you!

Lesson #17: Keep Up With the Literature in Your Areas of Interest

As revealed by my University of Toledo anecdote, I had not kept up with the literature in at least one of the areas in which I thought I had some expertise. How do you keep up with the literature in the areas of our field that are of particular interest to you? A good way to start is by regularly examining the most

recent issues of several of the journals in your area of interest. Ask your professors which ones they think are the most important for you to skim through.

After you have identified the journals in which you are most interested, skim through a few of them on a regular basis (preferably every few months, but even once or twice year is okay, at least by my standards!). Now that most journals are available online, accessing most journals should be fairly easy. When you do so, look at the titles of the articles in each issue, and read the abstracts of the articles whose titles interest you. If you are still interested in an article after having read its title and abstract, you should electronically file it for future reference (if you are really ambitious, you may even choose to read the article before you place it in an electronic folder!).

One folder I that I could have filled up back in 1975 would have been of unsuccessful interview experiences. I did not get the job at the University of Toledo, nor did I obtain the faculty position at the next university where I was interviewed. Shortly thereafter I had a job interview at a research and development center, but once again I failed to get the job! This failure was particularly disappointing – I was the only person who was interviewed! I did feel better, however, when I was told that the only reason I was not hired was because there had been an unexpected budget cutback (at least that's what they told me!).

At this point, I decided to talk to my professors at Arizona State to see if they could give me some advice. This decision turned out to be a wise one because instead of advice, my professors gave me a job; they hired me as a faculty member in their department! This occurrence leads me to two further lessons:

Lesson #18: Let Your Professors Know You Are Looking for a Job

Lesson #19: (Prerequisite to Lesson #18): Demonstrate to Your Professors That You Do Good Work

Lesson #18 is important because your professors may be aware of job opportunities that you are not aware of. But lesson #19 is even more important because it is unlikely that your professors will recommend you for a position, or even inform you of some possibilities, if you have failed to demonstrate to them that you do good work. If, on the other hand, your work is good, your professors are likely to go out of their way to help you attain a good position. Because recommendations from professors often are a critical factor in determining whether a recent graduate obtains a particular job, I suggest that if you are still a student you should pay careful attention to lesson #19 (Would you expect a professor to say otherwise?).

When my professors hired me as one of their colleagues, it was with the understanding that if another good job opportunity arose, I would pursue it. Thus, I would be able to broaden my horizons and share the wisdom I had acquired at Arizona State with faculty members and students at other institutions. Besides, the contract money with which I had been hired wasn't expected to last forever!

Fortunately, well before Arizona State ran out of the contract money that was being used to pay me, I came across an announcement regarding an instructional design position that was available at Florida State University.

Unfortunately, although the position sounded very interesting, the position announcement indicated that applicants were expected to have skills in a number of areas in which I had no experience or training. Nonetheless, I decided to apply for the position. And, sure enough, I got the job! Which brings me to the last lesson.

Lesson #20 (Also Known as “The Formative Evaluator’s Advice”): If the Job Doesn’t Fit, Revise It. Apply for Jobs That Interest You, Even If You Don’t Have the Exact Qualifications Advertised

As I previously indicated (see lesson #15), oftentimes organizations in our field are seeking to hire someone who has expertise in a particular area and are likely to identify that area in their job announcement. While it is certainly to your advantage if you have expertise in that area, my experience, and indeed those of many of my former students, tells me that it is often worthwhile to apply for a position even if you don’t possess all of the specific skills called for in the job announcement. Why would an employer hire someone who does not have several of the skills the employer is looking for? Two reasons: they may not find a suitable candidate who possesses the skill set the employer was seeking and/or they may find that another candidate’s skill set is equally or more appealing. So, as long as the set of skills specified in a job posting is not too far removed from the set of skills you possess, I encourage you to apply for the position.

In my case, when I was offered the job at Florida State, I was told that the fact that I was strong in some skill areas more than outweighed the fact that I lacked some of the skills they had emphasized in their job announcement. Fortunately, as those who hired me at Florida State had hoped, I was able to acquire some of those other skills once I obtained the job.

The lessons I have described in this chapter led to my obtaining my position at Florida State, the place where I happily worked for forty-six years! I hope that by following the lessons I have described, you will be able to obtain a position that has been as enjoyable as mine has been. Good luck!

Summary of Key Principles

1. Having a broad range of skills is likely to increase your chances of employment. Make sure to develop a strong set of communication skills and technology skills, as well as skills related to each of the phases of the instructional design process, including analysis, design, development, implementation, evaluation, and management.
2. Develop an area of expertise within the instructional design field, making sure that the skill set you decide to focus on is one that is currently in high demand and is likely to remain so for some years.
3. Most instructional design positions, including higher-paying ones, are in business and industry. If you are interested in working in that environment, be sure to acquire a clear understanding of how businesses operate. Taking one or more business courses may prove to be very helpful.
4. Starting while you are a student, become an active member of the

instructional design profession. Joining a professional organization and becoming active in it (e.g., helping with the work of the organization, delivering papers at conferences, and submitting papers for publication) will increase your visibility and help you establish a professional network that will help you find a job and advance in your career.

5. Be proactive when you are searching for a job. Search a wide variety of sources that post job openings, ask your professors for advice and assistance, and don't be hesitant to apply for a wide variety of jobs within the field, including those that call for a set of skills that don't quite match yours.
6. When you apply for jobs (or submit proposals for conferences, presentations, or papers for publication) you are likely to receive some, perhaps many, rejections. Don't become dejected by these rejections! Keep on trying! If you do so, there is an excellent chance that you will succeed.

Application Questions

1. Assume that you are currently seeking a job in our field (perhaps you really are!). Examine at least three of the sources of job openings identified in this chapter and find at least six position announcements that describe jobs that are of interest to you. List the specific skills most frequently mentioned as being required for these jobs. Analyze the degree to which you possess each of those skills and list specific steps you might take to improve your abilities in the areas where you feel improvement is necessary.
2. Interview at least two of the recent graduates of your program who have obtained positions similar to the type of position you are interested in. Ask each graduate to discuss the factors that they felt were instrumental in helping them obtain their job. Use the list of lessons contained in this chapter as a prompt, asking the interviewees to indicate which of the lessons describe factors that were important in their successful job search effort.

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Avenues to Support the Professional Development of Instructional Designers

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WHAT IS PROFESSIONAL DEVELOPMENT?

Professional development is of paramount importance for instructional designers in advancing their careers and ensuring their continued success. In a field characterized by ever-evolving technology and pedagogical methodologies, staying updated is not just a choice but a necessity. Continuous learning and skill enhancement enable instructional designers to remain at the forefront of their profession, adapting to new tools and strategies that enhance the learning experience. It allows them to bring fresh and innovative approaches to their work, ultimately benefiting their learning audiences and the organizations that they work with. Furthermore, professional development fosters networking opportunities, exposure to diverse perspectives, and the chance to collaborate with experts in related fields, which can significantly enrich an instructional designer's skillset (Brown & Green, 2018; Ritzhaupt et al., 2020).

Regardless of what industry an instructional designer may work in, a primary goal among instructional designers is to facilitate learning and improve performance. Professional development is a necessary means to meet this goal. Professional development refers to a structured and ongoing process by which individuals, typically in their careers, engage in learning activities, experiences, and opportunities to enhance their knowledge, skills, competencies, and overall job performance.

The instructional design field is experiencing a rapid evolution, driven by advances in educational technologies impacting the delivery of instruction. Emerging technologies such as artificial intelligence and machine learning, virtual reality, and augmented reality are transforming how instruction can be personalized and delivered to learners (Bodily et al., 2019; Xie & Rice, 2021). These trends in technology require instructional designers to reevaluate

design processes and instructional strategies to engage learners through different types of interactive experiences.

As a result, it is important that instructional designers keep pace with the growing trends in the field and adopt a mindset that values continuous learning. In the International Board of Standards for Training, Performance, and Instruction (2012) *Instructional Designer Competencies*, professional development is recognized as an essential skill. Under the Professional Foundations domain, professional development is addressed in the third competency: *Update and improvement knowledge, skills, and attitudes pertaining to the instructional design process and related fields*.

Professional development in instructional design is crucial because the field is continually evolving with advancements in technology, learning methodologies, and pedagogical research (Koszalka et al., 2012). Instructional designers must stay up to date to provide learners with effective, engaging, and relevant educational experiences. By prioritizing professional development, instructional designers can refine their knowledge, skills, and attitudes, ensuring they remain competitive and capable of delivering impactful learning solutions that meet the evolving needs of learners and organizations (Dicks & Ives, 2009; Lowell & Ashby, 2018; Muljana et al., 2020). This chapter will provide an overview of the purposes of professional development, types of professional development, and means to engage in professional development.

PURPOSES OF PROFESSIONAL DEVELOPMENT

Establishing a Professional Identity as an Instructional Designer

Establishing a strong and distinct identity as an instructional designer is crucial for several reasons. First and foremost, a well-defined professional identity helps instructional designers stand out in a crowded field and enables them to differentiate themselves from others. This can be particularly valuable in competitive job markets, where employers often seek candidates who bring a unique set of skills and perspectives. By articulating their identity, instructional designers can showcase their specific expertise and approach to designing effective learning experiences, setting themselves apart from their peers.

A clear professional identity also enhances an instructional designer's confidence and self-assuredness in their work (Tracey & Hutchinson, 2018a). When individuals have a strong sense of who they are as professionals, they are more likely to make informed decisions and take ownership of their projects. This self-assuredness can lead to greater creativity and innovation in their instructional designs, as they are not constrained by doubt or uncertainty (Tracey & Hutchinson, 2018b). It also helps them establish better working relationships with colleagues, as they can clearly communicate their value and contributions to the educational process.

Additionally, a well-defined professional identity can open doors to networking and collaboration opportunities. When instructional designers have a clear sense of who they are and what they bring to the table, they can more effectively connect with peers, mentors, and potential clients or employers who align with their values and goals (Muljana et al., 2020; Ritzhaupt et al., 2020). This networking can lead to collaborations on innovative projects, shared

insights, and professional growth. It can also provide a sense of community and support within the field, as instructional designers with similar identities can learn from each other's experiences and perspectives, ultimately contributing to the collective advancement of the profession (Tracey et al., 2021).

The Role of Professional Organizations in Career Development

Professional associations play a crucial role in supporting the career development of instructional designers, particularly in the higher education sector. Instructional designers in higher education have distinct competencies and skill requirements compared to their counterparts in other sectors, focusing on areas such as instructional improvement, objectives, learning sequences, methods, assessment, and evaluation (Halupa, 2019; Richardson et al., 2019; Ritzhaupt & Kumar, 2015). They must be multifunctional, blending instructional and technology competencies to assist faculty, students, and staff in various capacities.

Career growth and professional development are vital for instructional designers to stay current in the evolving field of educational technology. While some competencies are gained through academic programs, much more is learned on the job and through professional experiences. Instructional designers in higher education often come from diverse backgrounds, some with prior teaching experience, and many hold advanced degrees. Professional associations like the Association for Talent Development (ATD), the Association for Educational Communications and Technology (AECT), and the International Society for Performance Improvement (ISPI) have set standards that influence academic curricula and professional requirements for instructional designers. They offer resources such as conferences, social media communities, workshops, and professional courses to help instructional designers fulfill their roles effectively. However, it's important to note that certifications like Certified Performance Technologist (<https://ispi.org/store/ListProducts.aspx?catid=766580>) and Certified Professional in Talent Development (www.td.org/certification/cptd/introduction) may not fully align with the unique context of instructional designers in higher education.

To attract and retain professionals in the instructional design field, professional associations can use a range of resources, including listservs, social media, journals, and job boards, to provide career development opportunities and keep instructional designers informed about the latest research and trends (Ritzhaupt et al., 2020). They can also organize career events and job fairs at conferences, connecting designers with employment opportunities that match their expertise and needs. Ultimately, professional associations bear the responsibility of nurturing career development among their members in this dynamic field.

Enhancing Design Skills Through Upskilling

Instructional designers often need to engage in upskilling to remain relevant and effective in their profession. The field of instructional design is continually evolving, driven by advancements in technology, changes in educational methodologies, and shifts in learner expectations. To keep pace with these

developments, instructional designers must regularly upgrade their skills and knowledge. For example, the integration of new digital tools and learning management systems (LMS) requires instructional designers to become proficient in these technologies to create engaging and effective e-learning materials (Intentional Futures, 2016; Muljana et al., 2021; Rodríguez-Triana et al., 2020). Staying current in the field ensures that instructional designers can provide innovative and impactful solutions to meet the evolving needs of educators and learners.

Furthermore, upskilling enables instructional designers to adapt to changing pedagogical approaches and educational trends. As teaching methods and theories evolve, instructional designers must incorporate these changes into their design processes to create learning experiences that align with the latest best practices (McDonald et al., 2021; Shuell, 2021; Zhang et al., 2022). For instance, the shift toward active and experiential learning necessitates that instructional designers acquire new competencies in designing interactive and immersive learning experiences (Koçak et al., 2019). Continuous learning also allows instructional designers to stay informed about accessibility and inclusion standards, ensuring that their materials are accessible to all learners, including those with disabilities. By upskilling in these areas, instructional designers can deliver inclusive and equitable education.

Lastly, upskilling can enhance career opportunities and job security for instructional designers. Employers often value professionals who demonstrate a commitment to ongoing professional development and possess a diverse skillset (Ritzhaupt et al., 2020). By acquiring new skills, such as proficiency in emerging authoring tools, data analysis, or project management, instructional designers can expand their career options and increase their value in the job market. Additionally, staying updated with the latest industry trends and technologies can make instructional designers more resilient to economic and technological shifts (Weidlich & Kalz, 2021), reducing the risk of obsolescence and enhancing their long-term employability in a competitive job market.

Bridging Theory to Practice

Bridging theory to practice in instructional design is of paramount importance for the field's continued growth and relevance. Current instructional design scholarship can be categorized into several main areas, including applying instructional design practices to improving learning and performance, exploring educational technologies for learning and performance facilitation, and understanding the role of instructional designers (Gibbons & Yanchar, 2010; McDonald & Yanchar, 2020; Shearer & Park, 2018). While many studies have focused on the practical applications of instructional design, there is a noticeable gap in research that delves into pedagogical practices for training purposes. Therefore, there is a pressing need for additional research to identify and refine instructional strategies that can support the professional development of instructional design students, equipping them with the skills necessary to solve problems in diverse contexts effectively.

To address this gap, instructional design educators should draw from research studies that highlight trends in the field and related areas to provide their learners with evidence-based practices (Bodily et al., 2019). This approach allows for the tailoring of instructional activities to meet the real

challenges faced by instructional designers in their professional roles. One promising avenue is the utilization of studio-based pedagogical methods from other fields, acting as a bridge to help students transition from their academic identities to professional practice identities (Knowlton, 2016; McDonald et al., 2019). Further exploration of such approaches and other methods with similar potential for results should be encouraged within the instructional design community. This integration of theory and practice not only enhances the education of future instructional designers but also ensures that the field remains adaptive and effective in addressing the evolving needs of various contexts.

TYPES OF PROFESSIONAL DEVELOPMENT

Professional development can be delivered in a variety of different formats such as onboarding, formal training, just-in-time learning, and informal learning. Onboarding consists of formal on-the-job training that an individual may be required to complete when they are beginning a new position with an organization. Learning modules that are presented during onboarding typically introduce the strategic goals and vision of the organization and other human resource compliance requirements such as information technology security, sexual harassment, communication expectations, and company policies.

Formal training refers to a structured and organized educational process designed to impart specific knowledge, skills, and competencies to individuals. Formal training typically follows a predetermined curriculum in a classroom, workshop, or online setting. Formal training to support the professional development of instructional designers may include degree and certificate programs in instructional design at a higher education institution or professional certifications.

While instructional designers may be responsible for developing just-in-time resources for their learning audiences, they may also find themselves on the learning end for their own development. As the field of instructional design continuously evolves with emerging technologies and changing pedagogical trends, designers must remain agile and responsive. Just-in-time learning allows instructional designers to acquire specific knowledge and skills precisely when they need them, making it easier to keep up with the latest tools, strategies, and best practices. This on-demand learning empowers instructional designers to address immediate challenges, ensuring that their solutions are current and effective, and ultimately enhancing the quality of the educational materials they create. Common examples of just-in-time learning that most instructional designers have accessed at one time are video tutorials or step-by-step guides for how to perform different functions using e-learning software. These resources are examples of tools that instructional designers can access when they are learning how to perform a new task or one that they do not perform routinely.

Moreover, just-in-time learning aligns closely with the instructional design process itself. Designers can apply the principles of just-in-time learning to create more engaging and effective learning experiences for their learners. By understanding the value of providing essential information at the right time, in a concise and easily digestible format, instructional designers can

design more user-friendly, focused, and impactful instructional materials. Not only do these just-in-time experiences help the instructional designer, they also provide them the ability to experience what their learners may experience when seeking just-in-time resources.

Over the years, there has been an increase in informal learning opportunities to support individuals' professional development. Informal learning provides a more dynamic and flexible avenue for individuals to acquire knowledge and skills outside of traditional instructional settings. Informal learning can occur in a variety of ways, from conversations with colleagues at work, informal discussions with peers working in a similar field, seeking guidance from mentors, self-directed learning, and attending conferences and other networking events (Yanchar & Hawkley, 2015). Social media has also taken a prominent role in the informal professional development of instructional designers by providing a platform to share information through video posts, blogs, reports, and learning modules.

Instructional designers can leverage social media platforms as powerful tools for their professional development in several ways. Firstly, social media allows them to join and engage with communities of fellow professionals in their field (Muljana et al., 2021). Platforms like LinkedIn, Twitter, and Facebook host numerous groups, forums, and pages dedicated to instructional design. By actively participating in these communities, instructional designers can share experiences, exchange ideas, and stay updated on the latest trends and best practices. These interactions foster networking opportunities, enabling them to connect with like-minded individuals and potential mentors, which can greatly enhance their professional growth.

Secondly, social media serves as a platform for continuous learning. Many experts and institutions share valuable insights, research findings, and educational content related to instructional design on social platforms. It also provides a platform for sharing one's work and ideas, enabling instructional designers to receive feedback, recognition, and constructive criticism from a global audience, further promoting growth and development.

Using social media as a platform for informal professional development enables instructional designers to connect with a community of peers, stay informed about industry trends, access a vast pool of educational resources, and nurture their creativity. By using social media strategically, instructional designers can foster a dynamic learning environment that enhances their skills and expands their professional network.

Networking as a Means of Professional Development

Networking is a very important means of professional development in any field, and this is certainly true in the field of instructional design. Networking includes connecting with peers, mentors, and experts, enabling the exchange of knowledge, ideas, and best practices. By building a professional network, instructional designers can tap into a wealth of resources, gain insights into emerging trends, and seek guidance on challenging projects (Ritzhaupt et al., 2020). These connections can foster collaboration, creativity, and problem-solving, ultimately enhancing the quality of instructional design work.

Instructional designers should actively engage in networking with their peers and other designers for several compelling reasons. First and foremost, networking provides a valuable platform for knowledge exchange and sharing best practices. Collaborating with fellow instructional designers offers opportunities to learn from their experiences, gain insights into effective design strategies, and stay informed about emerging trends and technologies in the field. By tapping into the collective expertise of the community, instructional designers can enhance the quality of their work and continuously improve their design processes. Engaging in professional development events, conferences, or workshops allows instructional designers to connect with peers, experts, and other professionals in the field. This networking can lead to collaboration opportunities, sharing best practices, and gaining valuable insights into different approaches to instructional design.

Furthermore, networking fosters a sense of professional camaraderie and support. Designing effective learning experiences can be a complex and often solitary endeavor. Engaging with other instructional designers creates a sense of community and solidarity, where individuals can share their challenges and triumphs, seek advice, and find encouragement. This support network can be particularly valuable during times when an instructional design may be facing unique design challenges. Building relationships with other designers can also lead to potential collaborations on projects, enabling the creation of innovative and impactful learning solutions.

Professional development in instructional design via networking is indispensable for staying current in a rapidly evolving field. The educational landscape continuously adopts new technologies, methodologies, and pedagogical approaches. To remain effective and relevant, instructional designers must engage in ongoing learning and skill enhancement. Networking may involve attending conferences, workshops, and webinars, participating in relevant courses, or obtaining certifications. As the field of instructional design continues to grow and diversify, networking will continue to serve as a pillar of professional development for individual instructional designers, as well as fostering a community of skilled professionals dedicated to creating engaging and effective learning experiences.

Mentorship as a Means of Professional Development

Mentorship plays a vital role in assisting instructional designers at various stages of their careers. Firstly, mentors can provide valuable guidance and insight based on their own experiences in the field. For novice instructional designers, having a mentor can help them navigate the complexities of the profession, gain a deeper understanding of the intricacies of instructional design, and accelerate their learning curve (Rowland & DiVasto, 2001). Mentors can offer practical advice, share lessons learned, and provide constructive feedback that is often not readily available through formal education or training programs.

In addition to practical guidance, mentorship can be instrumental in helping instructional designers set and achieve career goals. Mentors can assist in identifying professional aspirations, mapping out career paths, and developing strategies for advancement (Stock & Duncan, 2010). Through regular interactions with mentors, designers can receive valuable advice on skill

development, portfolio building, and networking, all of which are critical for career progression. By having someone who has “been there and done that,” instructional designers can gain a clearer sense of direction and purpose in their professional journey.

Moreover, mentorship can contribute to the personal and professional growth of instructional designers. Mentors can serve as role models, instilling confidence and a sense of purpose in their mentees. They can offer encouragement, foster a growth mindset, and provide emotional support during challenging times. Through mentorship, designers can also access opportunities for networking and exposure to different facets of instructional design, which can broaden their perspectives and inspire innovation in their work (Mancilla & Frey, 2020). Ultimately, mentorship is a mutually beneficial relationship, where both mentors and mentees learn and grow, contributing to the overall development and success of instructional designers in the ever-evolving field of educational technology and design.

AREAS THAT WARRANT CONTINUING PROFESSIONAL DEVELOPMENT FOR INSTRUCTIONAL DESIGNERS

There are a variety of topics and skills instructional designers may be interested in acquiring and enhancing through professional development. Skills that instructional designers in the field often seek to enhance are project management, leadership development, communication, emerging technologies, and inclusive design practices. The following are topics that warrant ongoing professional development to support instructional designers in the field.

Project Management

Training and other professional development activities related to project management skills is invaluable for instructional designers because it equips them with the tools and methodologies to efficiently and effectively handle the complex nature of their work. Instructional design projects often involve various components, including content development, multimedia integration, collaboration with subject matter experts, and adherence to tight deadlines. Project management skills help instructional designers prioritize project needs by creating clear timelines, task lists, and resource allocation plans. This structured approach ensures that critical elements are addressed promptly and that the project stays on track, preventing bottlenecks and missed deadlines.

Instructional designers often find themselves managing multiple tasks concurrently, making effective project management even more critical. They must balance various aspects of the project, from content creation to technology integration and assessment design. Project management training enables designers to break down larger projects into manageable tasks, assign responsibilities, and track progress, thereby enhancing efficiency (Allen & Gardner, 2021; Williams van Rooij, 2013). Additionally, these skills allow instructional designers to anticipate and mitigate potential roadblocks, ensuring smoother project execution. Furthermore, the ability to design with the unknown in mind, a core aspect of project management, helps instructional designers adapt to changing project requirements, learner needs, and unforeseen

challenges, resulting in more flexible and resilient instructional designs that can meet evolving educational objectives. In essence, project management skills empower instructional designers to be more organized, agile, and responsive in their work, ultimately improving the quality and effectiveness of the learning materials they create (Klein & Kelly, 2018; Svihla, 2017).

Leadership Development

Instructional designers can benefit significantly from leadership development training and other professional development activities in this area because it equips them with the skills and knowledge to take on leadership roles within educational organizations. Leadership development programs offer insights into organizational leadership, allowing instructional designers to better understand the inner workings of educational institutions, including their goals, structures, and challenges. This understanding enables instructional designers to align their instructional designs with the broader objectives of their organizations, ultimately enhancing their ability to make a positive impact on student learning outcomes and the institution as a whole (Kenny et al., 2005).

Moreover, leadership development training provides instructional designers with valuable performance improvement strategies that they can apply to their work. These strategies involve setting clear goals, tracking progress, and implementing effective feedback mechanisms, which are critical for enhancing the quality and impact of instructional materials and methods (Shaw, 2012). Leadership development also equips instructional designers with conflict resolution skills, an essential ability when navigating the dynamics within an educational organization. By honing these skills, instructional designers can foster collaboration and address issues more effectively, thereby contributing to a more productive and harmonious work environment that supports the goals of the institution. In essence, leadership development training empowers instructional designers to not only excel in their roles but also become catalysts for positive change and innovation within their educational organizations.

Communication

Effective communication is paramount for instructional designers because it is at the core of their role in developing successful learning experiences. Instructional designers serve as the bridge between subject matter experts, educators, and learners, and they must be able to convey complex ideas and instructional strategies clearly and coherently (Klein & Kelly, 2018; Ritzhaupt & Kumar, 2015). Therefore, professional development in this area is particularly important.

Through effective communication, instructional designers can gather essential information from subject matter experts, understand the educational objectives, and translate this knowledge into well-structured learning materials. Clear and concise communication is also vital in conveying instructions to educators who will implement the materials, ensuring that they understand the pedagogical goals, the use of technology, and assessment methods.

Instructional designers must communicate effectively with their target audience – the learners. This includes designing materials that are engaging,

easy to follow, and capable of sustaining the learners' attention. Effective communication in the design process results in clear learning objectives, well-organized content, and user-friendly interfaces. It is through effective communication that instructional designers can ensure that the learning materials meet the needs and expectations of their learning audiences. In essence, professional development that promotes strong communication skills enable instructional designers to collaborate with diverse stakeholders, design compelling educational content, and create an environment conducive to effective learning and knowledge transfer (Summers et al., 2002; York & Ertmer, 2016).

Evolving Educational Technologies

Instructional designers require ongoing training and other types of professional development activities to stay abreast of evolving educational technologies because the field of education is continually influenced by technological advancements and shifts in pedagogical approaches. New educational technologies, software, and digital tools are regularly introduced, offering innovative ways to engage learners and enhance the teaching process. To remain effective in their roles, instructional designers must continuously update their skills and knowledge to incorporate these emerging technologies into their design strategies. Additionally, as educational methodologies evolve, instructional designers must adapt their approaches to align with new pedagogical trends and the changing needs of students. Training ensures that instructional designers can harness the full potential of these evolving technologies, create up-to-date and impactful learning experiences, and ultimately provide a high-quality education that prepares students for the demands of the modern world.

Inclusive Design Practices

Instructional designers can greatly benefit from training and other types of professional development in inclusive design practices, as it empowers them to create learning experiences that are accessible and welcoming to a diverse audience. Culturally inclusive design ensures that educational content and materials consider the cultural backgrounds and perspectives of learners, making them relatable and respectful of various cultural contexts. This approach not only fosters a more inclusive learning environment but also enhances learner engagement and relevance (Gropper, 2015; Gunawardena et al., 2018). Training in culturally inclusive design equips instructional designers with the skills to craft content that reflects the values and experiences of a wide range of learners, promoting cross-cultural understanding and making education more culturally responsive.

In addition to cultural inclusivity, training in accessibility is crucial for instructional designers. Inaccessible learning materials can create barriers for individuals with disabilities, limiting their access to education. By learning accessibility principles, instructional designers can ensure that their materials are usable by everyone, regardless of their physical or cognitive abilities (Rao, 2021; Rieber & Estes, 2017). This not only aligns with legal requirements but also reflects ethical considerations and promotes the principles of universal design. Moreover, incorporating user experience (UX) design principles into

their training enables instructional designers to create learning materials that are not only accessible but also intuitive and user-friendly. This results in an improved learning experience for all learners, contributing to better engagement and comprehension, and ultimately making education more inclusive for everyone.

PROFESSIONAL ORGANIZATIONS THAT OFFER PROFESSIONAL DEVELOPMENT IN INSTRUCTIONAL DESIGN

There are a variety of professional organizations that provide networking and programmatic opportunities to support instructional designers' professional development. While the following is not an exhaustive list, it does include some of the more popular organizations. professional organization is devoted to forwarding the goals of a profession through development and networking opportunities (Surry & Stanfield, 2008).

The Learning Guild is a professional organization that prides itself for being a community of practice, supporting instructional designers in a variety of industries and roles. The Guild provides its members with a variety of resources such as blogs, reports, and podcasts to provide members with information of the latest trends in the field. The Learning Guild hosts several popular conferences in the field of learning design, such as DevLearn and Learning Solutions.

Founded in 1943, The Association for Talent Development (formerly known as the American Society for Training and Development [ASTD]), is the largest professional organization for workplace learning and performance. Their members comprise instructional designers, performance consultants, talent development managers, and workplace learning professionals (ATD, 2023), representing more than 120 countries and industries of all sizes. ATD also offers a certification for individuals interested in workplace learning and performance through their Certified Professional in Learning and Performance (CPLP) designation.

EDUCAUSE is a nonprofit association that provides professional development and networking opportunities to instructional designers and educators working in higher education. The organization offers a variety of certificate programs and badging opportunities for instructional designers looking to enhance their skills.

Founded in 1962, the International Society for Performance Improvement (ISPI) is the premiere organization for the field of human performance technology. Members of ISPI represent academia, government, nonprofit, industry, and independent consulting sectors around the world. Similar to ATD, ISPI has a number of local chapters in the United States, as well as globally. The organization offers a certification for Certified Performance Technologists (CPT) for individuals in the field to emphasize their level of proficiency in the field of human performance technology.

The Association of Educational Communications and Technology (AECT) has a division, Organizational Training and Performance, that focuses on performance improvement initiatives experienced by the instructional designer. As noted on their website, the division's mission is to "bridge the gap between research and practice, facilitating communication, collaboration and sharing between academics, students and practitioners across multiple

disciplines interested in applying current theory and research to training and performance improvement initiatives” (AECT, 2023).

The Online Learning Consortium (OLC) is a professional organization that promotes community among educators and leaders in online education with an emphasis in enhancing how instruction is delivered through digital means. OLC hosts conferences and online professional development courses to support instructional designers working primarily in higher education settings.

CONCLUSION

Professional development in instructional design is essential to keep instructional designers updated with the latest pedagogical techniques and technological advancements. Continuous learning and skill enhancement enable instructional designers to remain at the forefront of their profession, adapting to new tools and strategies that enhance the learning experience. By engaging in the various types of professional development activities described in this chapter, your career as an instructional designer is likely to be greatly enhanced. Embracing ongoing professional development opportunities ensures that instructional designers are well-equipped to make sound design decisions, integrate technology effectively, and meet the evolving needs of learners in a variety of environments.

Summary of Key Principles

1. Professional development empowers instructional designers to stay current with the latest technologies and educational methodologies, ensuring that they remain effective in their roles.
2. Continuous learning through professional development opportunities allows instructional designers to adapt to the ever-changing needs of learners and organizations, contributing to their long-term career success.
3. Engaging in professional development fosters a culture of innovation, enabling instructional designers to bring fresh and creative solutions to instructional challenges.
4. Networking with peers and experts in the field during professional development activities provides instructional designers with valuable insights and the chance to collaborate on cutting-edge projects.
5. Professional development not only enhances an instructional designer’s skillset but also increases their value to employers, leading to career advancement opportunities and greater contributions to the field of education.

Application Questions

1. Identify three or four professional development activities you already have engaged in or intend to engage in, and describe how they have, or are likely to have, a positive impact on your instructional design work.
2. In what areas or emerging trends within instructional design do you

- feel least confident or knowledgeable, and what steps can you take to address these gaps through targeted professional development?
3. Reflecting on your long-term career goals as an instructional designer,

what specific professional development objectives or milestones should you set for yourself in the coming year to ensure you are progressing toward your aspirations?

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Performance Consulting

Catherine Tencza and Judith Hale

Dr. Judith Hale and Catherine Tencza are both career performance consultants with more than a half-century of experience between them. Performance consultants work with clients to solve issues related to helping people do their jobs better, especially when it comes to making sure they are equipped with the right skills and knowledge to succeed. While Judy and Catherine are from different areas of the country, have different degrees, and have worked on different types of projects, they both have enjoyed success in running small consulting companies, and they share a common vision of what it takes to be successful. In this chapter, Judy and Catherine – together and separately – tackle some of the questions people commonly have about consulting in our field.

Q What is an independent consultant? How is this role different from that of a contractor? A sub-contractor? An internal consultant?

JUDY SAYS . . . Independent consultants have their own professional training and instructional design practices. They offer their expertise, at a price, to help organizations in the public and private sectors design, develop, deliver, and evaluate learning solutions. Their expertise consists of both work-for-hire and advice. The work-for-hire component may include analyzing performance data to identify learning needs, producing instructional and performance support materials for live or online distribution, delivering training, facilitating meetings, and evaluating the effectiveness of programs. The advice component includes offering informed suggestions on issues such as selecting delivery technologies, interpreting data, sequencing content, and sharing information. It is the advice component that distinguishes someone as a consultant compared to a contractor. Without the advice component, you are a temporary worker doing what you are told.

The title sub-contractor means a person is work-for-hire. Sub-contractors may or may not be contracted to provide advice. Whether they operate as an extra set of hands or a consultant depends on their relationship with whoever hired them.

Internal consultants, too, contribute professional and technical expertise on how to build workforce capacity. However, they are not independent businesses, so they do not engage in the business management and business development activities that independent consultants do.

Q What does a performance consultant really do?

CATHERINE AND JUDY SAY . . . A performance consultant defines and helps solve problems related to people having the ability or the capacity to do their jobs well. On any given day, each of us might have two or three client meetings – typically virtual – that involve some balance of structured listening, project management, and solution presentation.

CATHERINE SAYS . . . Let's look at a typical day – yesterday, in fact.

- 8:30 Pre-conference call with a project team in advance of a client call. The project was a medium-sized one and involved a handful of people on the client side and on the consulting side. We talked about where we were in the project, timeliness, roles, and upcoming activities, all while looking at the detailed project plan. We talked about the key items to discuss with the client, how we wanted to approach these items, and who would take the lead on each part of the discussion.
- 10:00 Follow-up call with the same client, a hospitality company. In this particular case, I took the lead, managing the call and making sure we got through our agenda items and got resolution on any issues.
- 10:45 Scrolled through the news and had a cup of tea (I love being my own boss!)
- 11:30 Call with a long-time client about a potential new project related to systems training. I asked questions about the project goals, the key stakeholders, the timeline, and the client's vision. I did an informal SWOT (strengths, weaknesses, opportunities, and threats) analysis in my head. I paraphrased what the client said and confirmed that I understood the need. I said that I could help and promised to get back to them with a plan.
- 12:30 For the next two hours, I answered email (a 24/7 job), surfed the Internet, procrastinated on working on the proposal, had lunch, worked on the proposal, and threw in a load of laundry.
- 2:30 Client meeting to present a macro design for a project. The client had asked for a three-day instructor-led workshop to teach participants how to facilitate diversity, equity, and inclusion (DEI) conversations. They wanted participants to learn both DEI content and facilitation skills. After some research, I proposed an eight-week "learning lab" where participants would access curated resources and then practice facilitating conversations themselves. Rather than an instructor, we had a content coach and a facilitation coach. I took a story-telling approach to walk them through what the learner would experience through this process. The client OK'd the change in approach.
- 3:30 Follow-up meeting from 2:30 call to determine next steps.
- 4:30 Thinking time. I mused a bit about possible solutions for a different client who needs to figure out how to efficiently onboard people for a

highly technical, highly paid job with low turnover and low numbers. I often try to think a bit about problems at the end of the day, because then ideas seem to bubble up in my mind during the evening or while I sleep.

That really is typical – a lot of phone calls and web meetings around project management and presenting solutions and some time for thinking and writing.

The Dark Side. And then there are the days that end around 10:00 p.m. . . . It's pretty much the same as the previously outlined schedule, minus any time for thinking because:

- A client suddenly moved up a deliverable date.
- A new deliverable was added to an existing project.
- Unexpected, major feedback arrived.
- Somebody on the team had a personal emergency and I had to cover.
- I had a personal emergency.
- Meetings ran over allotted times.

On days like those, it is hamster-wheeling throughout business hours, leaving any thought or personal action items for the evening. This is real life for me.

Q What does a consultant career path look like?

Catherine and Judy Say . . .

Phase 1: Get experience. A lot of instructional designers work with large or medium-sized consulting companies before striking out on their own. Others work as internal consultants in a corporate or other environment and then start a consulting practice. Both of these are good options because they provide an opportunity to learn and get experience with very little risk. After two or more years as employees, career consultants decide to take the plunge and go out on their own.

Phase 2: Strike Out on Your Own. Another typical step on the path to consulting is to establish one bread-and-butter client to sustain income during any initial one- or two-year startup period. A lot of people use that one client – and a lot of hard work – to develop new business. This stage takes patience and perseverance, as it may take months or even years to see the results of networking and marketing. A lot of aspiring consultants change their paths at this point, due to income or family pressures or because the work or lifestyle isn't what they had envisioned.

Phase 3: Look at Long-term Goals. OK, let's assume that the work is flowing in and the consultant is happy and successful in the role. At some point, prosperous consultants will have more work than they can handle alone, and they'll have to decide to (1) stick to projects that one person can handle; (2) form a network of subcontractors and/or partners to take on larger projects; (3) grow from an independent consultant to a small business owner, with employees to perform the work; and (4) leverage the knowledge and experience gained to take on new challenges as a leader in an organization. All of these are valid options, and the right choice depends on individual goals

and ambitions. This chapter primarily focuses on consultants who work alone or in collaboration with sub-contractors.

Each Path is Unique. Some people have a very well-planned career strategy that they execute. Many people, though, have to make it up as they go along, based on good fortune, bad breaks, and family considerations.

CATHERINE SAYS . . . In my case, some decisions I pretty much fell into, and others were quite deliberate. To build a resume, I took on some subcontracting while I was in graduate school that grew and continued past graduation, and I decided that I liked having some amount of control over the work I did, the people I worked with, and my work environment. Most importantly, I loved the challenge of working with new industries and content all the time. I was lucky to have full-time work pretty much immediately. As the amount of work grew, I had to make a decision about whether to grow the business by hiring people. I talked with several senior consultants who had faced the same decision. In the end, I decided that I was happy with my current level of income and also that I didn't want the stress of having to bring in business to support multiple salaries. I have been a general contractor with others subcontracting to me, a sub-contractor to others, and an independent consultant working alone with clients. I have been working like this for 35 years. I anticipate someday transitioning to part-time consultant and spending time doing other things I enjoy.

JUDY SAYS . . . I made the decision to grow my business. Even though my business was classified as a sole proprietorship, I had 11 full-time employees for more than 25 years. Today I scaled back to only one full-time employee who has excellent analytic skills. This has allowed me to take only those projects I want. It has allowed me the time to offer an online curriculum in consulting.

Q What are the key foundational design skills a consultant needs?

CATHERINE SAYS . . . This question focuses not on consulting skills, but rather on the technical instructional design/performance improvement skills that are our core competencies. Choosing just a few key ID skills is hard, but here are some that seem to separate good consultants from those who should choose a different path:

1. **Design basics.** A performance consultant must be able to demonstrate fluency in an instructional design model, such as the Dick & Carey model, which helps you have a systematic approach to your work. This means having deep knowledge of the processes/tactics and the theory behind your model(s).

Advanced practitioners are usually grounded in multiple models and theories and are able to apply different models and recommend different approaches based on individual project needs. Advanced practitioners also have ability to translate theory into practice and to translate "ID talk" into language that the client understands and appreciates. But the foundation skill here is fluency in at least one model, so you have an organized way to approach the work.

For example, let's think about a familiar process-oriented model – ADDIE (analysis, design, development, implementation, and evaluation). Most people who work in and around training are familiar with the ADDIE model, so that is a good starting point when working with others. When it comes to phase one, analysis, all consultants should be able to advise the client on a strategic approach to the analysis based on the goals to be accomplished, discuss the rationale behind a variety of different data-gathering methods (e.g., interviews, observations, focus groups, surveys, review of extant data), and facilitate each of those methods.

2. **Translation.** A performance consultant must be able to explain how a given performance solution will make a difference that matters to the client. Let's say you have completed an awesome analysis and you have a great proposed solution. It might be simple or complex. Either way, you have to be able to sell that solution to the client in terms that are meaningful to them. They really don't care about skill building or even improved human performance unless you can show that the improvement will lead to something that they care about – which might be increased market share for a private company or, for a public health agency, a decrease in population obesity.

As a consultant you really need to have a combination of deep technical expertise and sophisticated communication skills to help the client see the logical flow from problem to solution to results. You must be able to tell the story for them so that not only do they understand, but they can champion it for you.

3. **Writing objectives.** A performance consultant must be able to generate a set of instructional objectives that clearly tie to work behaviors.

So much of our work is competency-based, and good designers all have the ability to build a logical path from results to job behaviors to terminal objectives (instructional goals) to enabling objectives (subordinate skills and knowledge). Great designers can quickly write very meaningful objectives, which may take one of many forms. For example, you might write three-part (i.e., behavior, conditions, and criteria) objectives and you might use a specific and meaningful (to designers) taxonomy of verbs, such as those by Gagné or Bloom. In any case, skilled designers make a clear link between what the learner must master and the job performer must do. Failure to do so can lead to all sorts of issues down the line, including project management and scope creep issues.

4. **Designing to objectives.** Given a set of objectives, a performance consultant must be able to develop a design plan that includes appropriate instructional strategies.

Once the instructional designer/performance consultant has a good set of objectives, the next step is to create a design plan that specifies how the instruction will help learners master the objectives. A foundational skill is identifying the most efficient path to whatever level of mastery you've specified. Almost anybody in a training organization can fill in a design plan with objectives, topics, instructional strategies, instructional time, and assessment, but somebody who is going to be successful as a consultant must do so with

elegance – combining sound theory with creative and engaging approaches and lean, targeted content.

A good consultant has enough depth to accomplish this no matter what learning methods or technologies exist. For example, if a new AI technology were developed tomorrow that enabled people to learn in a completely new way, a good performance consultant would be able to figure out how, when, and why to leverage that technology most effectively.

5. Developing solutions. Experienced consultants listen to their clients' needs and have a toolbox of solutions to meet those needs.

Consultants ask and answer a lot of questions. In fact, “asking and answering questions” is a pretty good job description for a consultant. What is driving performance? Is this a training problem or not? What part of this problem can be solved through improved training? Given all the factors that are driving performance in this situation, what interventions are likely to be most effective and efficient? Why? What are our options, considering our organizational strengths and weaknesses?

A good consultant should be able to answer all these questions and provide examples of various types of solutions. An experienced performance consultant can do so from their own wealth of experience, and a newer consultant can do so from case stories that he or she has researched.

JUDY SAYS . . . Over time, consultants may choose to expand or reduce their list of services. For example, some consultants may choose to specialize only in developing online training. Others may specialize in facilitation. Still others may expand their services to include the design of curriculum architectures. I have continued to focus on evaluation and certification.

Q What are the key non-ID skills a consultant needs?

JUDY SAYS . . . The key non-ID skills a successful independent consultant must have fall into four categories:

1. Building brand
2. Financial and business management
3. Project management
4. Life management

Building brand is done through a marketing and communications plan. Marketing is any activity designed to make you appear credible, influential, and successful. Communications is how you tell your compelling story that associates you with quality, value for the money, efficiency, innovation, and so on. A marketing plan includes who you want to reach, your budget, and the metrics you will use to judge your success. What is often overlooked is how you plan to build market awareness of your services and communicate your value proposition. Communication channels are the vehicles you will use to explain and promote your products and services so potential clients can find you. Vehicles include:

- Print, including business cards, ads, postcards, flyers, letters, articles, and the like

- Electronic, such as a website, webinars, blogs, videos on YouTube, or other social media
- Affiliations, such as membership in associations, volunteer work, participating on taskforces, and so on
- Speaking and publishing, such as serving on professional panels, conducting workshops, giving presentations, emceeding events, and writing a column for a professional journal

Some tips for building your brand:

- Learn associations' calendars, as the call for speakers can be nine months in advance.
- Learn publication calendars, because it may take nine months to one year between the time a manuscript is accepted for publication and the time it is actually published. Also be sure to check requirements related to format, length, citations, and reading level, and have someone edit your document before you submit it.
- Look for ways to establish yourself as an expert, such as speak, get quoted, serve on panels, offer to emcee or facilitate events, publish, and serve on taskforces.
- Take advantage of opportunities to be known to potential clients in a safe and un-threatening way by volunteering to serve on committees, and always deliver on your promises and give others credit.
- Keep your messages up to date on your website and social media.
- Turn your activities and accomplishments into promotional material by announcing new contracts, being selected to speak, hosting a panel, or serving on a committee.

Business and financial management is mostly about the discipline of separating your personal and professional finances and setting priorities. For example, you should set up a separate bank account to deposit your earnings and pay business expenses and get a credit card just for your business expenses. A good piece of advice is to always put aside at least 45% of your earnings for taxes, insurance, and infrastructure expenses. It is also important to seek advice from accountants that specialize in small businesses and consulting firms.

Project management is about coordinating your and others' activities so your deliverables are on time. You need to exercise oversight of your sub-contractors and sometimes your clients. Clients always remember when you come in late and forget they failed to complete their review on time. Creating a project charter, posting a timeline with agreed on delivery dates, and putting in frequent project status review dates help keep everyone on track.

Life management is about taking care of yourself physically and emotionally, and continuously learning in the process. Some tips:

- Believe you can learn how to be a good businessperson and how to be successful. It's a skill, not innate.
- Learn from your interactions – build an understanding about how to stand on the balcony and interpret what is going on.
- Manage your emotions in a healthy manner.
- Always communicate in a respectful way – a truly respectful way.

- Treat people with dignity and respect . . . even if they are stabbing you in the back, etc. (I'm still working on refining this skill!)
- Patience – know that it takes time to build a solid reputation.
- It also takes a long time for your networking to pay off. Just, again, be patient.
- Be willing to work long hours. Do right by your client.

Q How do you get started as a businessperson? How do you get consulting work?

JUDY SAYS . . . When I'm asked this question, I tell people to be clear about what their motivation is for wanting to be a consultant. The motives may be both personal and professional. On the personal side, it might be the desire to expand or reduce travel, have a more flexible work schedule, or to feel more in control of their lives. On a professional level, it might be to do more exciting work or to be their own boss. Unfortunately, some expectations may be unrealistic.

Next, I ask them to define what exactly it is that they want to sell. I probe further by asking them what they can offer that is commercially viable so that potential clients will associate them with meeting a need or solving their problems. I remind them that there are many ways to distinguish yourself, for example it might be:

- Your scope of services. Some consultants specialize in development or delivery. Others do everything from the needs analysis, design, development, delivery, and evaluation.
- The quality of your work. Some consultants market themselves on the basis of the quality of their work and support their claims with testimonials.
- The efficiency of your methods. For example, I have well-documented processes and can compete on the basis of my shorter cycle times.
- The value you bring. You can add value by doing what clients are unable to do, do not want to do, or do not have the time to do.
- The way you operate and your philosophy of life.

Next, I ask them to differentiate the activities they will engage in from what clients want. For example:

- You may describe yourself as a skilled facilitator, but clients pay you to get consensus on an issue or to get agreement by the team on roles and responsibilities or a course of action. So talk about what clients gain from your facilitation skills.
- You may develop online courses, but clients want employees to learn better, faster in ways that are less costly. So mention that employees can apply your content on the job.
- You may deliver instruction, but your clients want a more capable workforce, or to build bench strength across a work unit. So emphasize that clients are more confident in their employees' ability as a result of your work.

My intent is to get them to think about what differentiates them from other consultants. The goal is to be better than the norm.

Q Compare and contrast a career as a consultant versus one working as an instructional designer for an employer

CATHERINE SAYS . . . My husband and I met at orientation for grad school in the Instructional Systems program at Florida State. Before we graduated, we were married and had a baby on the way. I went into consulting; he went to work as an employee for various organizations, including state and federal agencies. It worked for both of us for some years, as one person could provide strong income and flexibility for parenting stuff while the other provided steady income and employee benefits.

Then there was a layoff, and suddenly we had two performance consultants in the family – one of the dyed-in-the-wool type, and the other one a consultant by necessity. For five years we worked together and lived together, until he decided to go back to being an employee, his current status.

So we have had a lot of time in our family to talk about the difference between being a consultant and working for an employer. People often come to us and ask, “Which path is better?” Luckily, we both think we made the right choice for ourselves. Here are some questions we suggest you answer for yourself before choosing a path or deciding to make a change:

1. I prefer to:
 - a. Meet new people all the time and form an ever-expanding network.
 - b. Have a group of trusted colleagues and a stable team of people I understand.
2. I prefer to:
 - a. Learn new things all the time and explore new industries and subject areas.
 - b. Get comfortable with my subject matter so I have a deep understanding of what people in my organization need to know.
3. I prefer to:
 - a. Sell the work.
 - b. Do the work.
4. I prefer to:
 - a. Bounce from one project to another; I crave new challenges but tend to become bored if I work on one thing for too long.
 - b. Build relationships and expertise over time so I feel relaxed and comfortable; I don't like the pressure of always starting something new.
5. I think risk is:
 - a. Invigorating.
 - b. Frightening.
6. Monday morning I have to present some new ideas to a group of decision makers. This makes me feel:
 - a. Very pumped up to present myself and my ideas to new people.
 - b. Stressed out.

7. The idea of having to report to someone and conform to organizational policies makes me feel:
 - a. Panicked; I need to control what I do.
 - b. Relaxed; why should I mind?
8. Pick one:
 - a. Job titles don't mean much to me. I like the idea of making my own career path.
 - b. I like the idea of getting promoted and earning greater responsibility throughout my career.

Every situation is different, but in general, if you lean toward the “a” answers, your personality is probably suited to consulting, while “b” answers are generally more compatible with a career as an employee (or as a contractor with only one client).

We have found that a strong preference for novelty or for stability is a huge difference between those who flourish as consultants and those who flourish as employees.

Q How is consulting different now than from ten years ago? Where do you see it going in the future?

CATHERINE AND JUDY SAY . . . The number of “accidental consultants” has increased. In the past ten years, the job market has had some ups and downs, and many instructional design professionals have found themselves out of work. Suddenly, they show up on LinkedIn as “consultants.” There is a difference between somebody who is doing freelance work between positions and someone who is building a professional consultancy.

There is a bifurcation in compensation. There is an increasing pool of freelance developers who can create training programs using the latest rapid development tools. The skill level in this pool varies significantly, but the sheer number of people drives the pay down. Performance consultants with a broad and deep skill set who can work at the strategic level are always in demand, and they can command high compensation. So, you have low pay and increased competition at the “developer” level, and high pay and greater demand at the “strategy” level. The increase in the “gig” economy further strengthens this divide. Being a consultant may not be by choice but necessity. When this happens, there is even a greater need for self-discipline, especially in financial planning practices that include healthcare and retirement. The important lesson here is that if you do not build brand and differentiate yourself from the competition, you will have to compete on price.

People are becoming a bit more specialized. Instructional design has always been a specialty, but now there are sub-specialties in e-learning, learning strategy, sales training, etc. Whether it is in a content area or a learning technology, many consultants are seeking niches to distinguish themselves.

Rapid development is showing its ugly side. Having the latest training toys has always been attractive. Thirty years ago, clients were determined to get laserdiscs for training. Twenty years ago, the possibilities for computer-based instruction were tantalizing. Today, we are likely to hear our clients say, “I want an explainer video” (even if they have no idea what one is), or “I

want microlearning” (even if their content is principle or process based, not about discrete facts), or “let’s do mobile learning” (even if all their employees sit at workstations where they access everything on computers). All these things have their purposes and appropriate uses, but none is the solution to all problems. Technology will continue to change. What is constant is the ability to leverage the best technology for the goal. In the past, the high cost of getting the infrastructure in place to develop new delivery systems often meant that people had to put some thought into their appropriateness. While it is great that many technologies are available with low capital investment, the ugly side is that a lot of very poor instruction gets developed that then puts a black eye on the technology and the profession. We have heard clients say, “e-learning doesn’t work,” and that’s a shame, because we think that a truer statement is, “e-learning that is poorly done or not the right solution to the problem doesn’t work.”

CONCLUSION

JUDY SAYS . . .

We hope the information we have shared gives you a better understanding of what it means to be an independent consultant. The suggestions throughout this chapter are intended to help you be better prepared should you decide to venture out on your own or changes in your employment decide for you. Our intent is for you to avoid the more troublesome pitfalls and not fear embracing challenges that you may not have anticipated. The journey wherever it takes you will bring you new insights about yourself and the world of entrepreneurship. When in doubt reflect on the mantra: competence leads to confidence, which leads to courage.

CATHERINE SAYS . . .

Choosing to become a consultant is a career decision, not a temporary gig between full-time jobs. Some days you can do a happy dance – when you see big positive results in a project that you led, when your clients are singing your praises, or just when you get to plan your own day and be your own boss. Other days are frustrating and demanding, but even then, you are the master of your destiny. If this sounds appealing, the life of a consultant might be a good choice for you.

Summary of Key Principles

1. A true performance consultant is a professional with deep expertise in instructional design as well as well-honed consulting skills.
2. Consulting is a business, and it requires careful decision making – whether to become one at all, how to get started, and how to grow and maintain a business.
3. Consultants must be self-driven in many ways, because they must develop new clients and nurture existing ones, drive their own learning, network constantly, and run a business.
4. Smart consultants follow good business practices. They separate personal and business expenses, set aside money for taxes and insurance, and work with an accountant who understands financial practices relative to consulting.
5. Market-savvy consultants build brand through a well-thought-out marketing and communications plan, and tell their story over and over.
6. It takes a combination of business and technical savvy and interpersonal skills – along with an entrepreneurial spirit – to be a happy and prosperous performance consultant.

Application Questions

1. You will be moving to another state in 18 months. The reason for the move is your spouse is being promoted, requiring a relocation to another office. You see this as an excellent opportunity to start your own consulting business. To prepare you for this career change, develop a marketing communications plan. In the plan:
 - a. Describe the services you want to offer and not offer.
 - b. Describe your services in a way that will set you apart from the competition.
 - c. Identify the people, positions, or groups you want to inform of your services.
 - d. Draft a series of messages to each.
 - e. Identify the communications media you will use.
 - f. Create a calendar indicating what you will communicate with each, when, and how.
2. You are an employee who has often toyed with the idea of venturing out on your own. There has been a change in management. You know you can stay, but you decide to seriously reconsider starting out on your own. Set time aside and reflect on the choice and use your insights to develop a plan of action even if that means staying employed for now. Use the following questions to guide your reflection:
 - a. What do I expect will be different about my life if I decide to go it alone?
 - b. Do I have the personal discipline to manage my time when there is no work and when faced with project deliverables? My finances?
 - c. Am I willing to continuously reach out and market my services? Create a support system I can trust? Find advisors who are committed to my well-being?
 - d. Do I have the skills and fortitude to negotiate terms that are in the best interest of my clients and myself?
 - e. How much ambiguity can I tolerate? Am I comfortable working with people who resist my advice?

SECTION **VIII**

Innovative Tools and
Technologies



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Hybrid Classroom Design and Implementation

Electronic Synchronous Multi-Site (ESyMS) Learning

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The field of distance learning has long recognized the value of combining modalities and strategies to deliver blended and hybrid learning. Indeed, more than 20 years of scholarship and practice inform this foundation (see Bozkurt, 2022 for a systematic review and discussion). The history of hybrid learning reports the benefits of blending in-person and asynchronous learning experiences (Voci & Young, 2001). Additionally, there has been an explosion in popularity of HyFlex learning designs (Beatty, 2007a, 2007b, 2019, 2020) and after the COVID-19 pandemic, hybrid learning has enjoyed a relatively steady rise in popularity and adoption. The rapid timeline of implementing emergency remote teaching in response to COVID-19 (Hodges et al., 2020; Carr-Chellman, 2021), combined with a significant funding infusion, further created perfect conditions for the proliferation of distance learning-enabled learning environments across higher education in the United States (O’Leary & June, 2023). When considering terms like hybrid, virtual, face-to-face, HyFlex, and distance-learning, hybrid is most salient to the electronic synchronous multi-site (ESyMS) learning environment. Allen and Seaman (2003) defined hybrid courses as those blending online and face-to-face components, with a substantial portion delivered online. It should be noted that this definition bears a striking resemblance to Graham’s (2006) commonly cited definition, which characterizes blended learning as “instruction based on the combination of two historically separate models of teaching and learning: traditional face-to-face learning systems and distributed learning systems” (p. 5). As a result of this overlap, both definitions are acceptable when referring to any combination of modalities to deliver instruction and, therefore, appropriate to apply to ESyMS.

Student demands shape the discussion as campus leaders and instructional staff seek to design the next generation of learning environments. Also influential is the increasing level of institutional investment that has been and continues to be made into learning technologies, propelled, in part, by the instructional challenges presented by COVID-19. The interaction between student demands and these investments accelerates the conversation around high-quality, effective learning spaces. Given the flexibility of available and emerging technologies and the persistent equity issue of broadband access, experts predict that hybrid approaches will be an increasingly popular modality (Ed Trust – West, 2020). Consider that Tyton Partners (2023), a strategy consulting group, found that students overwhelmingly prefer digital learning solutions once granted more flexibility and options.

Despite the popularity of hybrid learning, inadequate attention has been focused on the design of the learning environments via which hybrid instruction is presented. Current research on the topic of effective distance learning classroom design is scant, which may be due to a general belief that each learner works independently. Published studies often cite social isolation as a downside to online learning. Feelings of isolation in the online learning environment have been found to be the result of the inherent structure and uninvolved design found in many online courses (Sit et al., 2005). Further, early research on distance learning classroom design highlighted the importance of camera placement in building rapport between the instructor and students and the quality of the interactions (Jayasinghe et al., 1997). Additionally, in their annual review of trends and issues shaping higher education, Brown and Green (2021) noticed increased attention on learning environment design as universities seek to create active learning classrooms, implement extended reality, and seize the opportunity to incorporate technology innovatively. The evolution of technology presents an opportunity to revisit the question of purposeful learning environment design to support the modern hybrid campus.

The ESyMS concept arose at the University of Idaho in 2018 from a need to address the conflicting challenges of limited classroom and meeting space, increased demand for online courses, significant distances between campuses, and student preferences for flexibility. In this case, the ideal solution reimagined an existing large, awkwardly shaped, under-utilized room as a multi-use learning environment to support a variety of meeting types and needs with integrated smart technologies to enhance the audio and video experience.

BACKGROUND

A timeline of distance learning and an overview of relevant terms and definitions is outside the scope of this chapter. However, the following details contextualize the ESyMS concept for evaluating implications and guiding future work.

Modalities

Multiple reasons contribute to a lack of precise language and confusion encountered in the distance and hybrid learning literature (Bozkurt, 2019; Moore et al., 2011). Thus, this section briefly addresses commonly encountered modalities, including classroom meetings/face-to-face, hybrid, and virtual meetings.

Effective implementation of the hybrid modality in the context of the ESyMS learning environment necessitates the consideration of the intersection of the three delivery modalities (face-to-face, entirely online, and hybrid). Imagine the following scenario. Walking on a university campus in the United States, you quickly encounter a traditional classroom. This room contains a teaching station or podium with a computer or other presentation technology, rows of tables or combined table-chair desks, and a whiteboard for writing and projecting. The classroom setup seems limiting and may encourage course designers and instructors to plan lessons for lecture or seminar-style approaches to instruction.

The envisioned classroom has several additional limitations. For instance, welcoming a remote guest speaker into this learning environment is only possible if the teaching station has an integrated or external web camera and relevant sound system with a microphone and speakers. Students farthest from the teaching station are relatively indistinguishable from other background noise. The remote guest will, at best, be able to see a large crowd assembled before them and hear those within a few feet of the teaching station. At worst, the remote guest sees and hears only the instructor or person nearest the teaching station. Given that the teaching station, which hosts the remote guest via video conferencing software, doubles as the projected screen, the guest's video feed appears larger than life at the front of the room for all students to see.

Now imagine using this same room to host meetings for groups of participants with one or more remote participants joining by video conference. While the patchwork of technologies enables multimodal engagement, the solution is not ideal. This simplified example provides insight into the relevance of considering all aspects of the learning environment, including pedagogical and physical environmental design. The primary reason to consider an ESyMS solution is to allow for effective synchronous instruction and class engagement for and between groups of students in one or more physical classrooms(s) and with individual students logging in to the class using online video technology.

Related Literature and Practice

The imprecise definitions of hybrid and blended learning stem from practical and conceptual arguments. From a practical perspective, hybrid and blended learning may conjure one of many different images. Access to technology, pedagogical demands, and 20 years of research findings influence which image(s) you see. Martyn (2005) first described a structured hybrid learning model, dispersing student-teacher and student-peer online interactions between introductory and concluding face-to-face meetings. Other images might envision four to six intensive, in-person weekends to complement online instruction across 16 weeks. Modern technologies with real-time collaboration tools and ubiquitously available conferencing make it possible to rethink the concept. For example, you might visualize students meeting in a classroom, joined by other students who connect individually via video conference. Further, Beatty's (2020) HyFlex model blends the modalities to provide flexible learning paths and choices in changing paths. Regardless of which hybrid instruction model or style is envisioned, ESyMS accommodates multiple approaches within this learning environment because of the attention to learning space design.

When Skill and Young first addressed the intersection of learning space design and pedagogy, they took a hard stance, calling out the lack of attention to physical environments related to blended learning. Given the relatively rudimentary technologies available at the time, the authors recommended four strategies to guide the redesign and more effective use of classroom time and space to support digital learning that are still relevant today.

1. The integrated hybrid course is carefully redesigned to leverage powerful in-class, face-to-face teaching and learning opportunities with the content richness and interactivity of electronic learning experiences.
2. The e-learning component of the integrated hybrid class emphasizes facilitated “time on task” activities such as virtual teamwork, synchronous communication, and threaded discussions.
3. The redesigned integrated hybrid course moves away from traditional notions of “seat time” by carefully integrating “online” time investment into the “clock hour” contact calculations. Learning outcomes and “time on task” are the new metrics for assessing the integrated hybrid course.
4. The integrated hybrid course emphasizes learner empowerment and responsibility as a key value in the course design. Students are encouraged to take control of their learning through both team-based and independent learning activities. Opportunities for the creation of meaningful, student-controlled learning communities (both in person and virtual) are an essential component in most hybrid courses (Skill & Young, 2002, p. 25).

The most relevant of these strategies to ESyMS emphasizes the value of in-class, face-to-face teaching and learning opportunities. While the authors may not have imagined it then, we now frequently welcome in-person and online learners simultaneously.

ELECTRONIC SYNCHRONOUS MULTI-SITE LEARNING ENVIRONMENTS: TWO CASES

The ESyMS learning environment grew from the challenge of delivering increasingly mixed modality courses in multipurpose-use spaces. The institution offered graduate programs in flexible formats to be available for and meet the needs of the student population. Assessment of the hybrid or blended learning formats noted a lack of quality in synchronous hybrid learning and meeting experiences due to patchworked technology solutions. As part of a college-wide survey of student experiences in online learning environments, open-ended comments noted feelings of disengagement or isolation in classes that offered a videoconference option. Further review of the survey results revealed a pattern around camera capabilities and placement. The students shared a *fly-on-the-wall* perspective of experiencing hybrid courses with simultaneous in-person and online participants. Interestingly, they noted problems with gaining the instructor’s attention or contributing to large-group discussions due to the lack of eye contact and other social cues.

Case #1: University of Idaho

At the University of Idaho, the findings of the college-wide survey coincided with fundraising efforts, and in the summer of 2018 the university began

demolishing and renovating existing space in an old gymnasium. College leadership implemented a pilot learning environment to test the ESyMS concept. The following sections summarize the relevant planning, implementation, and evaluation activities.

PLANNING Recognizing the foundational need to address technology, ESyMS planning addressed necessary hardware, resources, and space. Minimum essential hardware included a computer with a microphone, video camera, and broadband internet connection. However, optimal hardware configurations use dual-panoramic video cameras, integrated microphone arrays, and AI-enhanced features to reduce background noise and enhance image quality and engagement. The dual-integrated cameras ensure that anyone joining remotely can see anyone in the room. Similarly, the integrated microphone array ensures quality sound from any location in the learning space. The AI (artificial intelligence) features automated moving cameras for the group spaces that appropriately focus on participants when the microphone detects active speaking.

Additional in-room technologies included an integrated Cisco-Zoom video conferencing system to support the integrated audio-video equipment and a presenter workstation with an integrated document camera at the presenter position. Two 65" displays hung above the cameras at the front of the space, and one 65" at the back, behind the presenter. Meteor Education designed custom furniture for the space, opting for a "V" configuration (see Figure 31.1).

Not fully illustrated in the initial blueprint design, two smaller Bring Your Own Device (BYOD) collaboration stations flanked the right side of the main meeting space. The break-out space labeled at the back of the room was shifted to the right, allowing lounge seating behind the main meeting space. The final design decision, a half-height glass wall along the back of the classroom, allows the space to serve as a clinical showcase during instruction and special events. The ESyMS Pilot Classroom opened in Fall 2020, hosting a teacher education course and related events.

The ESyMS design characterizes learning community configuration as encompassing a local *pilot room*, *wing room(s)* at other campus locations, and *in-the-wild* users who join remotely from anywhere (see Figure 31.2). This blending of synchronous locations resembles the Here or There (HOT) instructional approach to supporting learners in flipped or hybrid classes (Zydney et al., 2019). The local *pilot room* serves as the primary face-to-face location. Closely located classrooms resembling the *pilot room* serve as a secondary campus-based location, or *wing room*, to break larger class sizes into manageable groups. *In-the-wild* users might join individually or in small groups from remote *pilot rooms*.

Extending the concept and lessons learned from Zydney's team, ESyMS learning environment design considerations recommend attending to strategies, roles, and pedagogies. Pedagogical practices broadly address engagement, metacognition, and assessment. Instructional strategies used in hybrid learning spaces might be informed by the works of Farmer (2020) and Martin and Ritzhaupt (2020) to design flipped, guided, or integrated learning experiences through the available synchronicities. For example, flipped classrooms might approach instructional time by dividing it between one hour of asynchronous

FIGURE 31.1 An early blueprint design of the proposed ESyMS learning environment

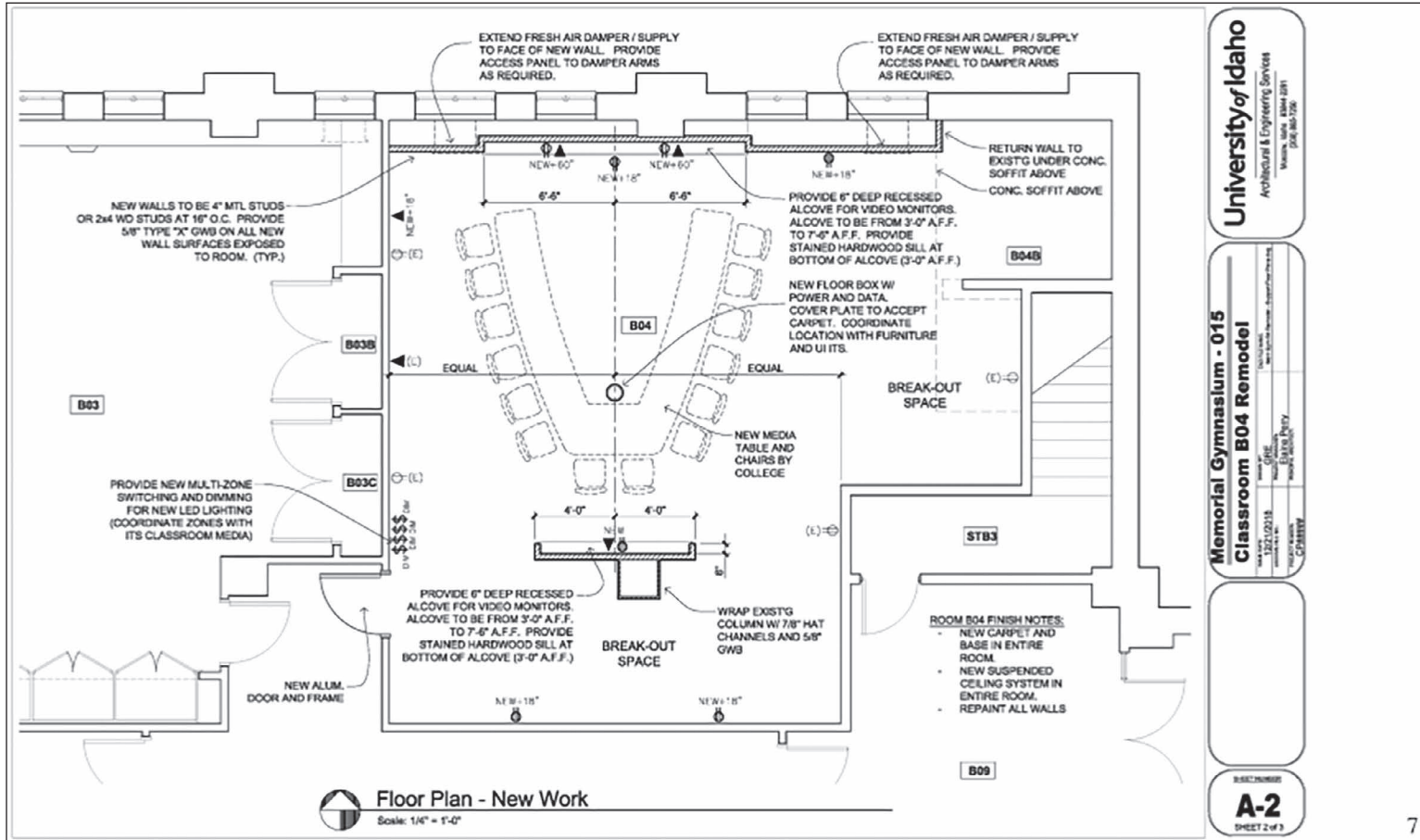
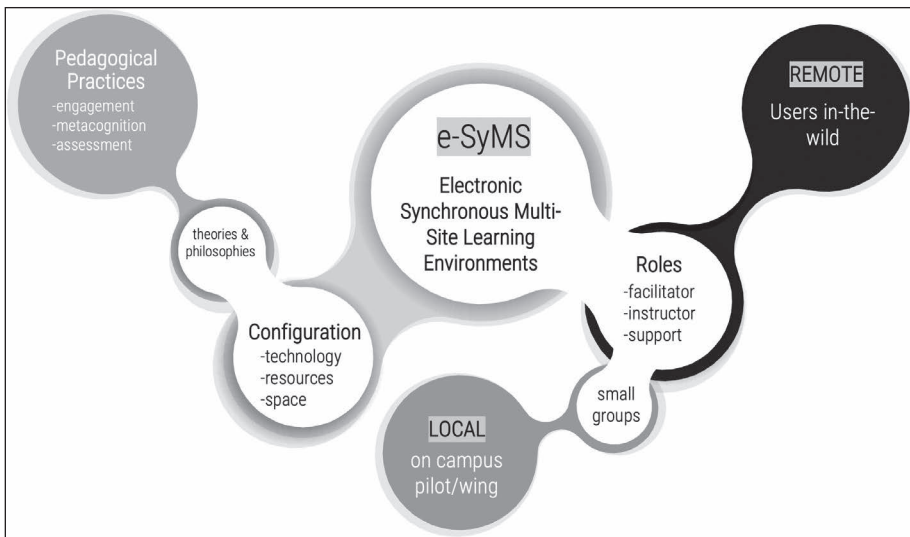


FIGURE 31.2 Configuration components of the ESyMS learning environment



and two hours of synchronous engagement, or lab- and project-based courses might engage learners in three hours of synchronous meetings that facilitate independent and group work using tools within the video conferencing platform. Additionally, implementing constructivist technology-enhanced active learning strategies, such as collaborative problem-solving, supports autonomy and provides a necessary paradigm shift in education (Ge et al., 2015). Leveraging the technological tools and practices required of an active learning hybrid learning environment, such as collaborative authoring or student-instructor interactions, helps build learners' confidence and motivation.

Roles necessary in an ESyMS learning environment include facilitator, instructor, users/learners, and technical support. Depending upon institutional resources, these roles likely feel familiar to experienced online faculty. During traditional lectures or courses, teaching assistants may or may not play an active role until it is time to take attendance or grade assignments. Pedagogical innovations, like assigning a teaching assistant or classroom learner to monitor and facilitate text chat in the video conference environment (or integrated messaging platform such as Slack), can mitigate the challenge of increased cognitive load on instructors in highly mediated learning environments (Sibbald et al., 2019). Consider the instructor attempting to lead an in-room creative activity with 15 students while also monitoring and assisting the six students joining by video conference. The hybrid learning environment requires instructors to divide their attention, and therefore sensory inputs, between their two groups of learners. A teaching assistant can observe and model the instructor's in-room actions to support the online learners or actively assist learners needing additional support. Alternatively, the teaching assistant can monitor the chat and call the instructor's attention to comments that need to be addressed. Providing this role also reduces potential student distractions (Kozar, 2016). Separate technical support must be provided for the instructor/facilitator and users/learners. Their needs are related, but student access depends on supporting faculty needs during the instructional experience. Thus, the emergent

nature of the event dictates priority. Student support must also be a priority, particularly in engaging with the synchronous learning environment. As an example of the need, it is not uncommon for students to experience difficulties once a synchronous session begins and need help to join or rejoin a class meeting. The exact configuration of these roles will vary based on the ESyMS model applied. For example, additional facilitators or tech support may be necessary if a *wing room* is involved in the configuration.

IMPLEMENTATION As a result of the COVID-19 pandemic, University of Idaho leaders asked faculty to consider flexible course designs in the fall of 2020. Thus, with a solid plan to implement an ESyMS learning environment, the college hosted a Secondary Science Methods course for preservice teachers in the space. This pilot case study included ten users/learners, with only one student consistently coming to campus for class meetings. Additionally, two students took advantage of the HyFlex design aspects to consistently access activities and class recordings asynchronously due to required course conflicts. Of the remaining seven students, five consistently joined via videoconference, and two fluidly exchanged attending in-person and online. All students benefited from the HyFlex design, experiencing at least one absence during the semester.

The course met weekly on Thursday mornings for three hours via Zoom. The instructor designed the course shell in BlackBoard Learn to use segmented modules within each weekly meeting. These modules aligned to topics covered during the synchronous class meeting, with additional asynchronous modules to complete later. Figure 31.3 depicts a screen capture of the class agenda for

FIGURE 31.3 A sample class meeting agenda for the ESyMS pilot class

Agenda 10/08


Posted on: Monday, October 5, 2020 8:00:00 AM POT

Synchronous

- 9:30. Logging in & getting settled
- 9:35. Activate learning
- 9:45. Online Science Education w/Moscow Middle School Teachers
- 10:30. Project WET Check-In w/jim
- 11:00. Continuing asynchronously

Asynchronous

- Informal Science Education
- Remote & Distance Learning
- Virtual Informal Science

Other Reminders

- Have you started playing with and researching your selected teaching resource for your PD Carnival Demo?
- How's the re-design work on your Project WET activity going? Cindy will be with us next week to check-in on status, refine ideas, plan media production, etc.

October '08 with approximate timestamps for each module covered during the synchronous portion. Bulleted lists guided users/learners to the additional modules for asynchronous inquiry and related course reminders.

Class activities for the course consisted of repeating patterns to establish an expected flow. For example, the 9:35 *Activate learning* module always included a brief (< 7 minutes) video to stimulate recall and interest in the proceeding modules and activities. Within the subsequent modules, the class might watch additional videos, preview other media, or silently read a short article before engaging in discussion and co-constructing notes, reflections, and other narratives to aid knowledge transfer.

The instructor post-edited synchronous recordings to break the file into smaller segments, organizing these by class and module for access. This design decision supported all learners in the course, regardless of preferred modality, and represents best practices in multimedia learning (see Clark & Mayer, 2016). The embedded directions and nature of these activities with structured flow allowed asynchronous students to work ahead, watching the synchronous recording later or completing the activities while following along with the recording. Additionally, the instructor revisited the weekly reflections, often captured by video, at the beginning of the next week to help the synchronous students connect with the asynchronous students and vice versa, contributing to the feeling of a learning community despite the transactional distances. For a related discussion of how the learning environment contributed to preparing preservice teachers to teach online, see Ekins et al. (2022).

EVALUATION The pilot ESyMS course provided an opportunity for the instructor to collect and analyze data concerning the delivery of the course and student experiences. Four key benefits emerged from the evaluation: increased instructor awareness of student perspectives, seamless application switching, higher-quality video recordings, and improved student evaluations of instructional practices. The analysis also revealed three considerations for future implementations: a need for faculty training/job aids, the need to ensure the video conferencing interface is fully accessible to the instructor, and the extent to which resources are used that may require additional technologies, such as a document camera.

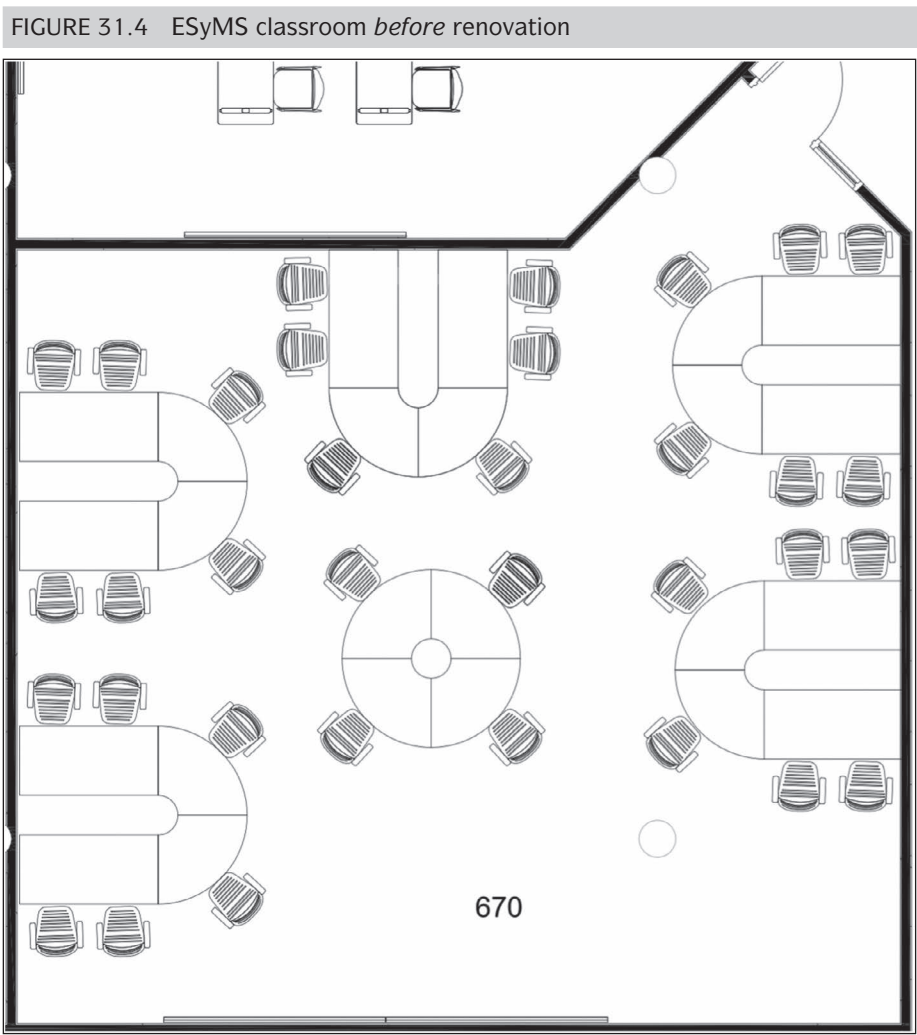
IMPLICATIONS The demand for and attention on online teaching and learning required across PK–20 contexts in 2020 significantly increased the importance of the ESyMS learning environment concept and these design recommendations. As some disciplines refine their entry into the distance learning space, those who have resisted or lagged behind adoption now realize opportunities for open access and increasing recruitment and retention. However, limitations still constrain the potential for expansion.

Considering future applications, two expansion concepts are planned and in development. In the planning stages with pending funding requests, the University of Alaska Anchorage plans to renovate a 36-seat capacity classroom into an ESyMS learning environment. As a classroom renovated to accommodate Zoom post-COVID, it will also serve as a *pilot room* for emerging educational technologies. The renovations will incorporate lessons learned

during the Idaho pilot, including re-evaluating the type of video conferencing integration.

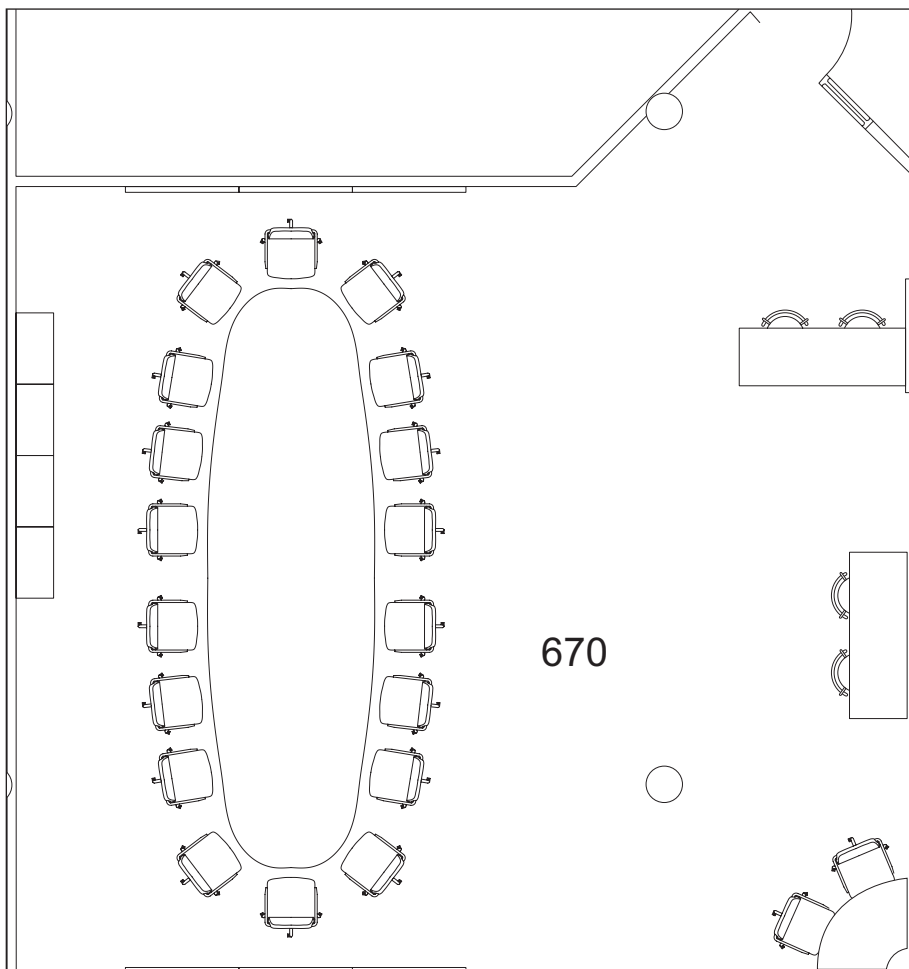
Case #2: University of Dayton

The University of Dayton has begun to deploy an ESyMS classroom in what was an under-utilized computer lab (See Figure 31.4). The room had been set up with approximately 40 desktop computer stations arrayed across eight flexible tables. The stations prevented students from having any desk space available. The location of the instructor station and the height of the monitors also made it very difficult for the instructor to be seen or to see the students, make personal connections with them, or build a strong community (both critical to our Marianist tradition at UD). This resulted in significant underutilization with a single class, a few days for computer-based tests, and a few other random uses of the space.



In 2021, it was determined that an opportunity to create an ESyMS classroom, building on the prior experiences at the University of Idaho, could allow for a collaboration between two colleges and a significant upgrade that could allow for collaborations across multiple American Marianist Universities. The room was finished in the summer of 2023 and is currently being deployed for both meetings and classes. Feedback from faculty collected in the fall of 2024 will help to determine additional ESyMS deployment across campus. The room has been set up similarly to the University of Idaho's implementation with an eye toward a small 12–18 learner face-to-face classroom space. Multiple cameras, a full audio array, six screens for the main space, and two additional collaboration screens for small groups, including screen-casting technologies, are included in the room (See Figure 31.5). The room was partially funded with endowments for educational technology.

FIGURE 31.5 Renovated ESyMS room with large conference table, two collaboration spaces, and instructor desk



Practical Considerations

Practical considerations of the ESyMS learning environment fall under one of three categories: student affairs, faculty development, and educational technologies. Student affairs include all support services that enhance the student experience, including physical and virtual, academic, and extra-curricular. For example, study abroad and international education programs considering how to link classrooms together (Fischer, 2021) might find significant inspiration and value in an ESyMS learning environment. As more institutions consider how to support a shifting workforce and enhance the student experience with value-added considerations, hybrid and active learning classrooms will become essential.

However, much work remains regarding faculty development if we are to prepare a distance learning-ready faculty. Learning from decades of research, Triyason et al. (2020) intentionally addressed faculty training and support in their hybrid pilot post-COVID, noting cautiously optimistic findings. Now consider the case of Zhao et al. (2022), engaging 20 higher education faculty in a community of practice for professional development targeting online teaching skills in 2019. Although the researchers took precautions such as outsourcing the professional development to another institution and modifying the content to account for prior learner experience, faculty still expressed a misalignment with their needs. Further, the student experience evaluation from the ESyMS pilot, mentioned previously, surveyed the students of these faculty and revealed several differences between what the faculty think they provide and what the students feel they experience (Dousay et al., 2020). Thus, ESyMS learning environment implementations should incorporate faculty development directly and intentionally.

CONCLUSION

The time has come to examine student and faculty experiences in the learning space and the interactions with other elements. Mishra (2019) provided a strategically sound update to the long-standing TPACK (or Technological Pedagogical Content Knowledge) framework, reminding practitioners and scholars alike to value contextual knowledge. Among the societal and organizational considerations recommended, Mishra noted that awareness of available technologies mitigates common challenges to effectiveness and success. The growing interest in learning space design firmly places active learning environments like ESyMS within current trends in instructional design and technology (IDT). Additional inquiry will inform the iterative improvement processes in future ESyMS designs.

Summary of Key Principles

1. Student populations desire flexible and varied ways to engage in learning environments. Given the	capabilities of current and emerging technologies, as well as market forces, experts predict that hybrid/

blended instructional and learning approaches will become increasingly popular.

2. This chapter introduced the concept of the electronic synchronous multi-site (ESyMS) learning environment. The ESyMS concept arose at the University of Idaho in 2018 from a need to address the conflicting challenges of limited classroom and meeting space, increased demand for online courses, significant distances between campuses, and student preferences for flexibility. Hybrid and blended instruction are salient practices informing the ESyMS learning environment concept.
3. Technology-enabled classrooms must effectively provide the tools necessary to address the varied needs and preferences of students who participate in a course using different modalities. Participation in an ESyMS learning environment may involve one or more students who individually attend class by signing into a Zoom room (in-the-wild) with simultaneous participation from groups of students present in live settings with the instructor (pilot room) and facilitator in another room (wing room) whether near or far.
4. The ESyMS concept addresses student learning, engagement, and satisfaction when participating in hybrid or blended learning environments. Both instructor and student presence and minimizing student feelings of isolation are important goals. Integral to ESyMS considerations are the physical characteristics of the distance learning classrooms (i.e., the pilot room and optional wing room(s)), the integration of technological tools, carefully selected strategies, supporting roles, and quality instructor training. The design and layout of the tables and chairs, along with appropriate camera placements and effective audio tools, are important. Designed in the right way, an ESyMS learning environment allows for maximum sensory engagement between all participants during live meetings, regardless of how they join the meetings.

Application Questions

1. Consider the envisioned classroom described in this chapter. Then, consider other classrooms and learning environments you've experienced. Were these spaces designed to work with blended or hybrid learning? Were they retrofitted to accommodate blended or hybrid learning? Without completely renovating the room, what guidance from the ESyMS concept can inform a redesign to make the space more pedagogically effective and engaging?
2. You have agreed to serve on an institutional task force to propose plans for updating classrooms to incorporate technology-enhanced active learning and aid with delivering more mixed-modality coursework. Using the two implementation examples, sketch out your ideal ESyMS *pilot room* and *wing room*, taking into consideration the essential technological tools, furniture, equipment layout, and possible roles.

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Learning with Podcasts

Tim Green and Abbie Brown

THE ORIGIN OF THE PODCAST

Podcasts are a popular medium for instruction and entertainment. There are currently over five million podcasts with over 70 million episodes available (Adgate, 2023), and more than 60% of Americans over age 12 have listened to them (Pew Research Center, 2023). Most people, though, have probably never considered exactly what defines a podcast, its historical development, or its key characteristics.

According to podcaster Andrew McGivern, a true podcast is defined as an audio file delivered by RSS (Really Simple Syndication), which lets listeners subscribe once to receive episodes as they become available (McGivern, 2022). As McGivern mentions, podcasts are episodic; they are typically a set of multiple show installments that relate to each other. As an example, National Public Radio's *Wait Wait . . . Don't Tell Me* podcast is an hour-long weekly news quiz show; series subscribers automatically receive new episodes each week (National Public Radio, 2023).

The word *podcast* is a blend of the brand name "iPod", Apple's famous portable media player released in 2001, and the word "broadcast". *Pod* + *cast* = *podcast*. It can be used as either a noun referring to the content or as a verb referring to production. These phrases use the word correctly: "I am listening to a podcast" and "I am podcasting this afternoon".

The original podcasting process was developed in the early 2000s by former MTV veejay and entrepreneur Adam Curry, who helped produce *iPodder* software, which facilitated the routing of audio files to digital music players. Curry worked with Dave Winer, the creator of RSS, which forwards Internet-based text feeds to subscribers to create a method of sending audio files through RSS (Brown & Green, 2008).

Though podcasting has been trending since 2004 (Brown & Green, 2008), its popularity increased significantly in 2014 based on the hit series *Serial*, produced by the creators of *This American Life* (Bergen, 2015). While podcasting was originally most closely associated with Apple products and services, competing organizations have embraced and capitalized on podcasting as well. Today, podcasts are available on a wide variety of digital platforms.

As part of the world of digital media distributed over a computer network, podcasts are descendants of Web radio. Like its traditional broadcast method, Web radio provides listeners a continuous, synchronous feed of audio content without the option to play specific programs at one's convenience. Podcasting, however, allows listeners to subscribe to shows and listen to them whenever they wish. Much like streaming video with applications like Netflix and Hulu, podcast listeners can use applications such as Apple Podcasts, Google Podcasts, Podbean, and Spotify to organize and play specific episodes or a show series.

It is important to have a clear understanding of the distinction between a podcast and an audio file. As we described, a podcast is an audio file delivered through RSS. This process allows a listener to subscribe once to receive episodes (i.e., audio files) as they are made available. The RSS process is what makes a podcast a podcast. So, although a podcast is an audio file, an audio file is not necessarily a podcast.

INTEGRATING PODCASTS AND PODCASTING

There are two primary ways we approach the integration of podcasting for student learning – consumption and creation. These two approaches may seem obvious because there are essentially two primary options of what can be done with any media – it can be used (i.e., consumed) or it can be created. Podcasting is no different. With the availability of relatively easy-to-use and low-cost technologies associated with podcasting, anyone with an Internet-connected device, audio-editing software, and a microphone can produce and share audio with the world. As a result, one estimate indicates that there are around three million active podcasts with almost 30 million podcast episodes published per year that span 100 languages (Howarth, 2023). There are estimates of 424.2 million podcast listeners worldwide during 2022, and as of July 2023 the number was 464.7 million (Ruby, 2023). Based on this data, there is no shortage of podcasts being created and consumed.

With such a plentiful source of this media available and with the relative ease of creating it, how do we take advantage of this and integrate podcasts for learning? The next section includes two strategies that include several techniques. As we discuss these techniques, the term *course* will be used. Keep in mind that we use course generically to refer to various instructional configurations – beyond an entire course – such as a class, a training session, a learning module, or a lesson. Also keep in mind that the techniques we have shared have worked for learners in our courses. Consider how you might adjust the techniques to best fit the needs of the learners in the courses you are designing or teaching.

One additional note to consider when integrating podcasts for learning is your work context. You may work in a context where your learners may not have the opportunity to or need to create a podcast. Instructional designers working in business and industry, government, or military training are generally more likely to have their learners consume podcasts rather than create them.

Integration Strategy: Consumption

A primary strategy – and probably the most obvious – is to use podcasts as course content; in other words, learners *consume* podcasts to engage with

content that is appropriate for a specific course. We employ this strategy to meet different instructional goals and learning objectives. Several techniques we use to implement this strategy are described next.

CONSUMPTION TECHNIQUES FOR LEARNERS

- *Supplement course content.* One of the most basic uses is to provide learners with outside content that can supplement the content they have received from course readings, lectures, and other course activities. Typically, if the podcast is used to supplement course content, it will provide new content or content that expands on the content learners have received in the course.
- *Review concepts.* Podcasts can be used as a review of content covered in a course. This could be a podcast that you produce for your learners that provides a summary and review of the content. This could also be podcasts produced by others that could work as a review of course concepts and ideas.
- *Provide access to experts and other perspectives.* There are many podcasts hosted by experts as well as podcasts that have experts as guests. These podcasts are great options for learners to hear what experts have to say about a topic. Learners can gain a different perspective from what is provided in a course by listening to these podcasts.
- *Explore topics or issues.* Podcasts can be used to provide learners with opportunities to explore specific topics or issues that interest them. This provides learners with opportunities to enrich their learning by exploring content that goes beyond what is provided in a course. This also has the possibility to motivate learners because they have control over the topics or issues they can explore. They can explore topics or issues not covered in the course, or they can go in more depth with assigned course content.
- *Engage with content at their own pace.* Podcasts provide learners with the opportunity to engage with content at their own pace because they can control the flow of the podcast audio. Learners can repeat parts that they may need to hear again or skip over parts that they may not need to hear. Learners can also engage with the content outside of a course. This gives flexibility of when and where they study and learn.
- *Differentiate instruction.* Differentiating instruction is an approach that adapts content, instruction, assignments, and the learning environment to the needs of the learner. A podcast is a way to differentiate instruction for learners by providing them with access to content in a unique format. It can help meet the needs of learners who enjoy or do better with hearing content rather than reading it. For learners who are not native English speakers (or speakers of the primary language in which the course is being taught), a podcast provides them with access to content in a way they can control. They can listen to the content in the manner that works best for them.
- *Use as announcements.* A weekly podcast can provide learners with important information about a course in a timely and consistent manner. The content can remind learners about upcoming assignments and due dates. It provides a preview of the content and what learners should

prepare for prior to engaging in a course for the week (or whatever the schedule is for the course). Additionally, it can help build a sense of community by providing a personalized approach to a course. The weekly announcements can be interjected with personal anecdotes and other information that allows learners to get to know you.

- *Start a discussion on a topic.* A podcast can be used to provide background information about a specific topic that can lead to a discussion. Learners would consume the content of a podcast prior to the discussion. The podcast would be a springboard to a discussion that would take place in the course.
- *Develop critical thinking skills.* Podcasts can provide learners with opportunities to practice and develop their critical thinking skills. Learners can practice how to consider and evaluate the information they get from a podcast. They can determine what type of podcast it is. Learners can evaluate the information for balance (e.g., are both sides of an argument or issue provided?), bias, and subjectivity of the podcaster. Learners can also analyze whether the content being presented is based on facts or opinions.

Integration Strategy: Creation

The second strategy we use is to have learners create their own podcast. In doing so, they are creating content, and they are learning and practicing a variety of skills related to media production. Having students create podcasts takes careful consideration and planning. It is important to consider intended learning outcomes, production elements, and technical components. These three areas need to be addressed before learners engage in creating a podcast. As you read about these, they may initially seem onerous. However, after you have worked through them a few times, they become less time consuming and easier to manage.

- *Intended Learning Outcomes.* Although this chapter supports using podcasts for learning, it is important to consider whether a podcast is the best solution for a course. To determine its potential efficacy, start with exploring what you want to achieve by using a podcast. Determine the intended learning outcomes the podcast will help address. What is the instructional goal or goals? What are learners expected to know or be able to do in a course? Answers to these questions will help you determine if a learner-created podcast is an appropriate solution.
- *Planning Elements.* Producing a podcast requires thoughtful planning because there are numerous elements that need to be addressed. One of the first is whether learners have the technical skills needed to create a podcast. If not, how will they gain these skills? Another element is if learners will work alone or in groups. Group work adds a layer of complexity that will need to be addressed. How will the work be divided among group members? Are there specific roles learners will take on? What are the expectations for each group member? How will learners be assessed and evaluated? The production process is the final element that needs to be considered. Learners must be familiar with the steps required

to produce a podcast. We briefly describe these steps in the section “Producing a Podcast for Learning”. In sum, they will need to be able to:

1. Determine the format of the podcast – how it will be structured, how long it will be, and who will speak
 2. Write a script or an outline of the content
 3. Record and edit the audio
 4. Upload the audio to be hosted and available through RSS
- *Technical Components.* There are several technical components that need to be considered. What equipment will be used to record and edit? A rather simple option is to use a smartphone with a podcast recording app such as Anchor. A more robust option is to use a microphone connected to a computer and record the audio using software such as Adobe Audition, Audacity, or GarageBand. Editing can be done in this software (as it can be, in a much more limited way, in podcast recording apps). Once the audio file is created, where will the audio file be stored? In other words, where will it be hosted for others to access? As a reminder, the audio file needs to be available through RSS for it to be a podcast. The most uncomplicated option is to use a podcast hosting provider such as Podbean or Libsyn. These two options are free. There are also paid options (e.g., Blubrry, SoundCloud) that include additional services like listener statistics that free hosting options often do not provide. A podcast hosting service will walk you through creating the RSS feed or it will create one for you automatically. A more complicated option is to host the podcast on a Web server you or your learners have access to. This option requires that an RSS feed is manually created, which can be complicated (although not impossible; there are instructions on the Web). The least problematic option, generally, is to provide learners with access to a paid-for podcast host over which you have control. Learners would be given access to upload their podcast files to the host provider or you could upload the podcast files for them.

CREATION TECHNIQUES FOR LEARNERS The following list provides several techniques for integrating learner-created podcasts into a course. As you read through the examples and read the phrase “create a podcast”, this can refer to a podcast file or a series of podcast files. Keep in mind that the techniques can be accomplished by one learner, with a partner, or in a group of learners.

- *Content reviews.* Learners create a podcast that reviews the major concepts and ideas from the course content. Learners are encouraged to bring in additional resources, synthesize the content, provide commentary about it, and ask questions. Learners are assigned different due dates throughout a course. This provides multiple opportunities for learners to listen to different reviews of the content. The podcast can serve as a way for learners to review for an exam or to gather ideas and information for another assignment. Learners can be provided a template to help organize the content and structure their podcast recording.
- *Presentations.* This is like the previous technique. The content focus, however, is on content or an issue not specifically covered in a course. The podcast is formatted as a presentation of information. Learners work in

small groups to develop the report and present it as a podcast. Time limit constraints (five to seven minutes) are often given to help learners focus and streamline what they share.

- *Overview of the weekly readings.* This podcast is a summary of the major ideas from the readings. In small groups (three to five), learners outline the content for the week and record their summary. The podcast is available prior to when the content will be discussed in the course. The summaries are typically brief – approximately three to five minutes.
- *Alternatives to writing assignments.* Podcasts can be offered as an alternative to writing an essay or a report. Learners can prepare a podcast on a topic that meets a specific purpose much like different types of writing would. Learners can tell a story. Learners can analyze and critique a research article. Learners can use the format of a persuasive essay to discuss a current issue. The podcast could have several “episodes” that expand on one topic. The different podcast episodes could focus on a different type of purpose (e.g., critique, persuasion). In addition to learning more about content, learners are practicing different writing and speaking skills.
- *Discussions.* Groups of learners work together to engage in a discussion about a topic, idea, concept, or issue. Group sizes are typically two to six learners. The learners are given a topic and a question (or questions) that frame the discussion. The first time that learners use this technique they will most likely respond one at a time. The goal, however, is to generate a back-and-forth discussion among the learners. Learners should be encouraged to ask additional questions of each other, to ask for clarification, and to disagree (respectfully). Again, the purpose is to engage in discussion.
- *Interviews.* An interview format for a podcast provides learners with the opportunity to better understand content, issues, and events while they learn and practice writing and speaking skills. Learners, as they conduct the interview, will learn and practice investigative research, question writing, the flow and control of a conversation, and rapport building. The purpose of the interview will depend on the course learning outcomes. The interview purpose, for example, might be to understand the work responsibilities of a professional in a specific field. Another example could be to understand the perspective of someone who has a first-hand experience of an event. Prior to conducting an interview with an outside person, learners should practice with a peer in the course.

Accessibility Considerations

It is important to consider issues of accessibility when determining whether to integrate podcasts. As an audio medium, podcasts are inherently inaccessible to individuals with a hearing impairment. It is important, therefore, to make sure that podcast content can be retrieved in ways that allow access for all. Whether learners are consuming or creating podcasts, accessibility issues must be addressed. A podcast that does not provide equal access violates the American with Disabilities Act (National Association for the Deaf [NAD], 2021). Make sure to do your due diligence with accessibility before integrating a podcast into your course.

There are several best practices that can be used to help ensure that podcast content can be consumed by individuals with a hearing impairment. It is

beyond the scope of this chapter to go into detail about all the best practices. We have, however, provided brief explanations of three we find particularly useful. We suggest you explore these (and additional best practices) in more depth if you are not already familiar with them.

- *Provide a transcript or show notes.* This is often considered one of the best approaches to make a podcast accessible. Transcripts and show notes are written versions of the audio content of a podcast. A transcript will most likely be a verbatim account of what was said during a podcast. Show notes are often a summary or the highlights from a podcast but may also include direct quotes from the podcast. If you provide show notes, it is important to capture the salient ideas presented.
- *Use closed captioning.* Although closed captioning is primarily used with video, it can be provided for audio files. Adding closed captioning to a podcast is application specific; in other words, the process for how to create and include closed captions will depend on the software used to record the podcast and the software used to play the podcast.
- *Carefully design the podcast website.* As we discussed, a podcast is an audio file delivered through RSS. This process allows a listener to subscribe once to receive episodes (i.e., the individual podcast audio files) as they are made available. The RSS feed a listener subscribes to is often made available on a website where the podcast is hosted. It is, therefore, important that this website follows best design practices for accessibility. Some of the elements that need to be dealt with are text readability, text arrangement (e.g., use of headings, table formatting), colors used, images included, and link descriptions. The World Wide Web Consortium (W3C) (www.w3.org) is a great resource for exploring website accessibility.

PRODUCING A PODCAST FOR LEARNING

The previous section focused specifically on two approaches (consumption and creation) to integrate podcasts and podcasting for learning. It is important to note that when we shared techniques for learner creation of different podcasts, we discussed different forms that these podcasts could take. We discussed purpose, format, and content. We did not discuss how to produce an entire podcast. In this section we share elements of the podcast we consider when we produce our podcast *Trends & Issues in Instructional Design, Educational Technology, and Learning Sciences* (<https://blubrriy.com/trendsandissues/>), which is an ongoing podcast (aka “a show”) that has over 240 episodes.

Producing a podcast consists of two major phases – design and development; both include multiple sub-steps. Keep in mind that your learners will not need to necessarily go through each of the sub-steps of the phases in as much detail as they would if they produced an ongoing podcast because some of the sub-step decisions will have been determined for them based on the technique used. For example, if you give learners the option to create a podcast as an alternative to a writing assignment, you will most likely give them constraints – such as one episode; no more than ten minutes; work alone; the specific topic; and the purpose. These are decisions that are normally made during the design phase; however, you will have made them for your learners in advance.

Designing Your Podcast

Before you begin recording and sharing your podcast you will need to consider the format and design of your show. Are you creating a single, stand-alone show or a series with multiple episodes? What is the time length for the show or the episodes? How often do you plan to release new episodes? Does each episode have a similar format?

EPISODES, SEASONS, AND SERIES Planning to produce a single show is different from planning to produce a series. In a series, each episode should share common elements that make the show a recognizable part of the entire series. This is where bumpers can be particularly helpful. Bumpers are the beginning and ending segments of the show (hence their name). The most common example of this for most of us is television theme songs. Most half-hour television comedies, for example, begin and end each of their episodes the same way; look at any episode of *The Simpsons* and you'll see that the opening and closing music and animation is the same. Because the bumpers are meant to be the same for each show, you can produce them in advance and re-use them each time you produce a new episode.

Naming the show that you produce is another design consideration. If you are producing a single show, the name should indicate the show's content as completely as possible in a brief phrase. If you are producing a series, the series itself needs a name and each episode gets its own unique name. Episode titles can be as simple as the episode's numeric place in the series (e.g., *Episode 18*), or it can be elaborate and clever word play (e.g., *Serial Episode 06: Five O'clock Shadow*).

If you plan to produce a show that is a series, you will want to consider whether the series will be organized by seasons or whether it will be ongoing. Seasons indicate a subset of episodes based on the time they are produced; a season might be all episodes produced in a single year, for example. Our *Trends & Issues* podcast is organized as ongoing with episode numbers but no indication of seasons. Although, on some podcast providers, you might see that we are in Season Ten (as of the writing of this chapter) because we have been producing the podcast for ten years. We did not make this distinction – the podcast provider did.

FORMAT Any show you produce will have a format. The only format we do not recommend is one where you begin to record and just ramble on. Before you begin to record your first show, we recommend that you decide how long the show will be and what major segments the show will contain.

The show length depends on the amount of content you intend to share and how you envision the listener interacting with the show. As an example, our *Trends & Issues* podcast episodes are deliberately about 15 minutes long because we assume most of our listeners are busy professionals and students who listen to get a quick update of the current trends in our field. You may find yourself designing shows for a similar audience, or you might find yourself designing more detailed shows that require a longer run time to immerse the audience more fully in the content. If you plan to produce a series, we recommend that each episode be roughly the same

length so that listeners know what to expect and what to look forward to (the exceptions are special episodes that may be longer or shorter because of the content).

The major segments of the show should be planned in advance as well. The most obvious segments of any show are the beginning, middle, and end, but that may not provide you with enough of a template for production. Segments are the organization of the show's content; decide on segments the same way you would approach presenting a lesson, by determining the objective and then determining the activities that make up the lesson.

GUESTS AND INTERVIEWS Many popular podcast formats include interviews or conversations with guests. This can be a wonderful way to meet and learn from experts. Guests may provide listeners with new and different insights. Hosting well-known guests may increase a podcast's popularity. If you invite guests to participate, you should have them complete a guest release (also known as a talent release or media release) form before recording begins.

SCHEDULING If you plan to produce a podcast series, scheduling becomes an important design consideration. There are a wide variety of schedule options ranging from releasing an episode randomly (whenever one is ready; perhaps one in January, another in March, and another in November) to releasing an episode daily. There is no single best scheduling approach; the scheduling you choose depends upon the content and listening experience you wish to provide. For our *Trends & Issues* series, we have chosen to release brief episodes every two weeks because we find this to be the best way to keep up with educational technology news reports posted in journals, magazines, blogs, and newspapers. Whatever option you decide to use, we recommend adhering to the schedule you set for yourself because this is a good way to gain a positive reputation and build your listening audience. Listeners appreciate consistency.

Although most of your production decisions will be based on the content you plan to provide and the audience you wish to reach, you should also consider yourself as both a resource and a limiting factor in what you plan to offer. You can only produce and distribute as much as you have time to create. As an example, it takes us about four hours to produce a single, 15-minute episode of our *Trends & Issues* podcast.

Developing Your Podcast

Once your design decisions are made, you will focus your attention on developing (i.e., physically producing) the podcast. It is important to understand that there are many different approaches to physically producing a podcast. Despite the different approaches that exist, they all include the three primary tasks: recording, editing, and publishing.

The decisions you make about producing your podcast will be based on several factors, such as the equipment you have available, the software you use, your comfort level with recording and editing audio, whether you are the only host or have a cohost (or multiple cohosts), guests or no guests, the location(s) in which the audio will be recorded, and how and where the podcast will be hosted.

Our approach has remained consistent since we started our podcast in 2013. We have, however, refined this based on what we have experienced and learned over the past ten years, and what has changed with podcasting during this time. Note that what we share is not meant to be a tutorial. It is meant to help you understand and consider what is involved with the production process.

RECORDING YOUR PODCAST We have primarily used QuickTime Player to record our audio using Yeti brand microphones. We individually record our own audio. Once we are done recording, Abbie sends his audio file to Tim (Tim does the editing). Recently, we have changed this process since Tim secured a RØDEcaster Pro audio mixer that allows him to record his audio and Abbie's audio together with relative ease using Adobe Audition. Abbie still records his audio using QuickTime Player in case there is an issue with Internet connectivity. We have experienced audio "hiccups" when there are lags in our Internet connections. Recording our individual audio helps us avoid this.

EDITING YOUR PODCAST We have improved our skill with editing (and recording) our audio through trial and error, reading tutorials, and viewing YouTube videos. There is an abundance of free resources that provide how-to guides and tips. We quickly learned in our process that starting with good quality recorded audio is a major element in determining the quality of a podcast no matter how good one's audio editing skills are.

We have used three different audio software providers for editing our podcast. We began with Audacity, moved to GarageBand, and now we use Adobe Audition. Each has met our needs at the time we used them. We have found Adobe Audition to be the most complex but also the most sophisticated. We currently use Adobe Audition because we find it works well with the RØDEcaster Pro audio mixer. We used GarageBand the longest because we had the most familiarity with it and we use the Apple computing platform.

PUBLISHING YOUR PODCAST Two major elements need to be decided regarding publishing your podcast. One is to determine how and where you will host your podcast. The second is to determine a website for your podcast. Although technically a podcast does not need a website, we recommend it because it can be a resource to share transcripts or show notes and other information related to your podcast, and you can have a link on the website to your RSS feed for individuals to subscribe. Our podcast website is a WordPress site.

There are different options to publish your podcast; however, we are only going to discuss using a podcast hosting provider. This is the most used option and the least complicated. There are many podcast hosting providers to choose from. The downside to this is that it can be an overwhelming process to select one. It was initially for us when we started our podcast; fortunately, early in our process we were given a personal recommendation of a company to check out. We have been with Blubrry (www.blubrry.com) since we started in 2013.

The process for publishing a podcast is not overly complicated once you have your podcast account configured. Configuring your account is a one-time process that will result in setting up an RSS feed for your podcast so listeners can subscribe to your podcast. The hosting service you use will step you through this configuration process, which likely will include submitting your RSS feed to podcast directories like Apple Podcasts, Spotify, and Stitcher. Once this is complete, you are ready to upload your podcast audio files.

The upload of an audio file is a simple process in most hosting providers; it is with Blubrry. When logged in to our Blubrry account, there is a menu option to “Upload New Media”. Click this link, drop in the episode file, click upload, and then select the option to make the file live – the process of publishing an episode is done. At this point, those who have subscribed to the podcast (using the RSS feed) will have the episode delivered and available to them when they open their podcast listening software. Because we have a website for our podcast, users can go to it and play episodes directly from our website. Remember, though, that if this was the only option to access our audio, it would not be a podcast. We provide this option because some individuals may want to listen to our podcast but not subscribe to it.

THE FUTURE OF LEARNING WITH PODCASTS

The relative ease of consuming and creating podcasts makes it an appealing medium for teaching and learning. Educators can provide and produce sophisticated content in a form that meets the needs of a variety of learners. In addition to consuming content through podcasts, learners can engage in the podcast creation process to experiment with media production and to practice and hone important skills like investigative research, speaking, collaboration, and critical thinking.

There is a robust and growing body of research that supports the positive impact podcasts can have on learning at various levels and in different contexts (e.g., Besser et al., 2022; Chaves-Yuste & de-la Peña, 2023; Chin et al., 2017; Clark et al., 2009; Gachago et al., 2016; Gunderson & Cumming, 2023; Hall & Jones, 2023; McLoughlin et al., 2006; O’Bannon et al., 2011). Although we are pleased about this research and we are advocates for learning with podcasts, we understand that podcasts and podcasting may not be for everyone. As you determine whether it is good fit within your teaching and learning context, we suggest you read some of the research literature. We also suggest that you consider answering and reflecting on your answers to the following:

- How comfortable are you with consuming podcasts?
- How comfortable are you with the podcast creation process?
- How does podcast consumption align to your course’s learning goals and objectives?
- How does podcast creation align to your course’s learning goals and objectives?
- What impact on student learning do you believe you would observe (or hope you would observe) because of the integration of podcasts?
- What do podcasts allow your learners to do that they couldn’t do in another way?

Whether you embrace podcasts in your courses or not, one thing is relatively certain, podcasts and podcasting are not going away. Past and current data support this. Another relatively safe prediction is that podcasting will continue to evolve as it has since its inception in 2001.

Summary of Key Principles

1. **The term podcast is the blend of two words.** It is a blend of the brand name “iPod”, Apple’s famous portable media player released in 2001, and the word “broadcast”. *Pod + cast = podcast*. A podcast is an audio file delivered by RSS (Really Simple Syndication), which lets listeners subscribe once to receive episodes as they become available. Podcasts are typically episodic, made up of series of multiple show installments that relate to each other.
2. **Podcast production and use have steadily increased over the past decade.** One estimate indicates that there are around three million active podcasts with almost 30 million podcast episodes published per year that span 100 languages (Howarth, 2023). There are estimates of 424.2 million podcast listeners worldwide during 2022, and as of July 2023 the number was 464.7 million (Ruby, 2023). This was a 9.6% increase from 2022. The total number of podcast listeners by the end of 2024 is projected to reach 504.9 million – an 8.7% increase from 2023 (Backlinko Team, 2024).
3. **Consumption and creation are two approaches to integrate podcasts for learning.** As with all media, it can either be used (i.e., consumed) or created. Podcasting is no exception. Learners can either consume podcast content or create their own podcast content. The learning outcomes for integrating a podcast will vary based on whether you have your learners consume a podcast or go through the process of producing their own podcast. There are numerous techniques that can be used for learners to consume podcasts and to create podcasts.
4. **Podcast creation requires careful consideration.** The creation of a successful podcast will follow a systematic process that includes two phases: design and production. Both phases include several sub-steps. The major sub-steps of the two phases are: determine the format of the podcast, develop the content (e.g., gather research, write an outline, develop questions), record and edit the audio, and make the audio available through RSS.
5. **Accessibility is a key element.** Podcasts are inherently not accessible to learners with a hearing impairment. Podcasts that are not accessible to all learners can be in violation of the Americans with Disabilities Act. Due diligence must be taken when integrating a podcast for learning to ensure that the podcast is accessible. There are design strategies that can be used to address accessibility.

Application Questions

1. A recent government regulation has mandated that medium-sized companies that earn government contracts must have their employees

involved in quarterly professional development. The topics of the professional development will change based on new government laws and regulations. The topics will be industry specific but will also include more general topics and issues related to human resources and the workplace. Companies are required to develop their own training or contract out to companies who provide the training at a cost. Employees will be required to 1) document their training hours and 2) pass objective-type exams based on the training topics. The Head of Training and Workforce Development at your company, who is your direct supervisor, has asked you and your instructional design team (three instructional designers and a media developer) to create a podcast that will serve as the primary method to deliver the professional development to approximately 450 employees. The company has three divisions. As the lead instructional designer, you will be the point person for the project.

- a. How would you approach this request from your supervisor?

What key information would you need to know? What questions would you ask? What feedback or advice would you provide your supervisor about this solution?

- b. Assume that creating the podcast is the instructional solution that will be used. How you would evaluate this instructional solution?
2. Consider a specific instructional context that you have been part of as a teacher or trainer (or as a learner if you have not been a teacher or trainer). Answer the following questions based on this context. Think about how you might integrate podcasts for learning in the instructional context you selected. Describe the instructional context. Describe a scenario in this context when learners would consume a podcast. What would you consider to be the benefits of this approach? What might be the challenges? Describe a scenario in this context when learners would create a podcast. What would you consider the benefits of this approach? What might be the challenges?

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Social Media and Instructional Design

Vanessa P. Dennen

Social media is seemingly omnipresent in contemporary life. People read and report news on social media. Mainstream media reports about events that have played out on social media, and social media companies are regularly in the news. People and organizations alike maintain accounts on popular social networking sites (SNS), and even adult non-users – around one-quarter of the adult population in the United States (Auxier & Anderson, 2021) – may find it difficult to avoid social media altogether.

The premise behind the aptly named technology that constitutes social media is simple: it is a mediated environment where social interactions can be fostered. Instructional designers have been interested in how social media might be leveraged to support learning and instruction since the introduction of the first widely adopted social media tools such as MySpace and Facebook. Their continued interest has been driven by multiple forces. People have opted to use social media in their everyday lives, making it a familiar technology for many. Some instructional designers believe that learners will be motivated by social media use in learning contexts, with hopes that it will have more than just a novelty effect. Others simply want to participate in a current trend. Additionally, social media technologies have developed alongside collaborative and discursive learning theories and frameworks such as connectivism (Siemens, 2005), creating symbiosis among trends for those who choose to adopt them. Regardless of the reason, instructional designers who adopt social media are effectively choosing to engage learners in active, and often student-centered, learning experiences.

As an educational trend, social media still meets the criteria for an emerging technology offered by Veletsianos (2010). Specifically, it has yet to accomplish widespread adoption in formal learning settings, and best practices related to social media use for learning are still being explored. Furthermore, as a category of educational technology, social media is continuously changing. Familiar tools introduce new features. New tools gain prominence, and others merge or shut down. Each new tool or feature brings with it a hype

cycle (Dedehayir & Steinert, 2016). In short, from a tool and technological affordance perspective, social media is far from static.

SOCIAL MEDIA TOOLS

Most people can list a few social media tools, even if they are not active users. Popular SNS such as Instagram, Facebook, X (formerly known as Twitter), Pinterest, YouTube, and TikTok are frequently featured in the news and entertainment media and are fixtures of everyday digital life. Each of these tools has its own look and feel, but many share similar features. Common features of these social media tools are presented in Table 33.1. Note that these features may have different names on different SNS, but essentially serve the same function.

TABLE 33.1 Social Media Tool Features

Feature	Description
Follow	This feature allows people to connect to each other. These connections may be unidirectional or bidirectional, depending on the tool.
Post	This feature allows people to write and share their own content with others.
Comment	This feature allows people to leave comments attached to content shared by others.
Reaction	This feature allows people to give feedback to others by clicking a button. The most common reactions are unidimensional acknowledgments of agreement (e.g., likes and favorites), but some tools incorporate a range of reactions (e.g., dislike, laughter) or enable up- and down-voting as reactions.
Direct Message	This feature allows people to share private messages, similar to text messages or emails, with their connections. Messages can be shared with individuals or groups and do not show up on the user's main page.
Share/Reshare	This feature allows people to share content with other people by reposting it to their own network, sending it via a direct message, or sending to another SNS or tool.
Save	This feature allows people to bookmark items they wish to find again. Some tools allow saved items to be organized into collections.
Tag	This feature allows people to apply labels to content. These labels, or tags, can be used to call a specific person's attention to that content (people tagging) or aggregate content that is similarly tagged.
Feed	A continuously updated aggregation of content that a person has subscribed to or that has been algorithmically deemed relevant to a person.
Groups	Spaces with restricted membership and a specific purpose.

The features described in Table 33.2 are commonly integrated in popular SNS, where they serve as proof-of-concept for the kinds of online interactions that can unite people with content and each other. In turn, these features are increasingly incorporated into learning and workforce software, where they enable more and different types of interactions among learners and colleagues. Whether popular SNS or proprietary platforms are used, social media tool features are thought to empower end learners by providing multiple interaction options.

SOCIAL MEDIA AND INSTRUCTIONAL DESIGNERS

This dynamic trend may be facilitated by tools, but more importantly it reflects how instructional designers have chosen to use and integrate those tools into instruction. Whereas a tool-centric perspective is useful for understanding technological affordances, the trend itself cannot be understood without examining social media from a lens of situated use. People use social media in intentional ways to achieve specific outcomes. Those outcomes may be related to personal socialization or entertainment, but they may also reflect professional and learning needs. Instructional designers use social media as a teaching and learning tool, incorporating it as a learning technology in the courses that they build, and also as a professional development tool. The following scenarios can be used to understand how social media is used by instructional designers and some of the considerations that are involved. Issues related to these scenarios will be discussed throughout the remainder of the chapter.

Scenario 1: Social Media in a Formal Class Setting

Kris is an instructional designer at a university working with a faculty member in the economics department who wants to design a course that continuously evolves to reflect current events. The course learning objectives will be stable from year to year, but rather than using staid case examples, the faculty member thinks it would be useful to cull living cases from the headlines and to explore multiple perspectives on these topics. The faculty member hopes to promote active learning, with students finding and contributing materials related to these living cases throughout the term and then collectively evaluating and discussing them. Kris is excited about the idea and has recommended using a social media tool of some sort to facilitate this sharing. The course learning management system (LMS) is cumbersome and teacher-centered. The only space where students can share on the LMS is on the discussion board. Kris and the faculty member both agree that a tool that facilitates integrated sharing from websites and social media to a common course space, along with the ability to tag, annotate, and comment on items, is ideal. The faculty member, an avid social media user in their personal life, notes how many popular SNS like Facebook, Twitter, and Pinterest, support these kinds of sharing and commenting, although each SNS has a very different feel. They also discuss the role that the faculty member should play in this form of active learning, providing clear expectations and initial examples, but then stepping back and letting the students shape the flow of examples and practice applying concepts in their discussion. For the initial implementation, they plan to simply use social media as part of a semester-long practice and discussion activity, offering a space for learners to share and comment on news and current events

items. The activity will be one of two participation options for students, allowing students choice during this initial term when Kris and the faculty member formatively evaluate the activity. If the activity is effective, Kris and the faculty member plan to consider ways that the activity could be extended to connect with other educational trends such as open pedagogy and microlearning.

Scenario 2: Social Media in a Corporate Learning and Sharing Network

Jana works for a real estate company, designing and delivering training to more than 100 national franchisees. At the recent annual meeting, there was a lot of interest among the franchisees in social media. They were using social media in addition to their official online channels to reach younger customers, and franchisees were sharing online handles as they networked with each other. The company was preparing to implement a new online platform in about six months, with social media–like networking capabilities. Jana was tasked with developing platform training and also setting up the new social spaces to encourage knowledge sharing among franchisees. Of particular interest to the franchisees was a private network for sharing materials related to local marketing campaigns so they could learn from each other. Where some franchisees were already leaders in this area and in a position to share, the ones that were slow to use this approach were eager to learn. Jana began to visualize her task: it didn't make sense to create a standard online learning module to train users on the new system, and she didn't want to take the examples of the early adopters and turn them into static training examples for the rest of the franchisees. Neither approach felt authentic, given the medium, and neither matched the dynamic nature of social media nor did anything to help build online community. Jana's excited about the prospects, but she's not entirely sure about the best approach. Some of the questions she ponders include: How much content does she need to design into the new system and how much can she count on franchisees to contribute? What supports are needed for less experienced people who feel uncertain about using a social learning platform? What kind of moderation and rules will be necessary to keep the space active and productive? How can she track the effectiveness of this approach? These questions will guide Jana's process as she explores how to set up the space and prepare training for the franchisees.

Scenario 3: Social Media for Professional Development

Monique works at a small, locally owned company where she has shifted from duties as a technical writer to broader responsibilities that also include instructional design. She's learned the job as she's done it, but she is starting to feel a bit stagnant in terms of professional growth. Her employer doesn't have the budget to send her to expensive professional conferences, and although she would like to earn a degree in instructional design, she's not presently in a good situation for going back to school. However, Monique knows there is a lot to learn about instructional design online. She plans to spend an hour a week looking for online communities and sharing spaces where she might encounter the people and resources that will contribute to her professional development. She's a bit worried about finding the right connections and whether she will

be accepted into online instructional designer groups. She also wonders if this effort will provide a good return on investment and whether she will develop new skills and a network that will help her get a promotion or even a new job.

Throughout the remainder of this chapter, these scenarios will serve as concrete examples of how instructional designers and others might use social media to support learning and performance through a host of *networked knowledge activities*.

NETWORKED KNOWLEDGE ACTIVITIES

Networked knowledge activities (NKA) connect learners with both content and each other, fostering conditions for learning in social media environments. These learning experiences may be formal and occur within well-defined networks, or they may be informal and individually driven. The NKA framework provides a helpful way of thinking about the different types of activities that people naturally engage in on social media and that also can be fostered in designed instruction (Dennen, 2019; Dennen et al., 2020).

The core NKAs support knowledge management (*collect, curate*), communication (*share, broker, negotiate*), and creation (*curate, construct*) functions (see Table 33.2). These NKAs are made possible when people *network*, developing

TABLE 33.2 Overview of Networked Knowledge Activities

Activity	Basic Description	Example of Learning Use
Collect	Locate and save resources on a topic	Search for materials to enhance learning or support a project or assignment.
Curate	Evaluate, select, and organize resources on a topic	Determine most relevant and high-quality resources to address a learning problem. Often coupled with collect and share.
Share	Make resources available to others	Provide other learners with access to resources on the learning topic.
Broker	Connect people and resources	Assist fellow learners in making connections or finding the specific knowledge that is valuable or personally meaningful to them.
Negotiate	Engage in learning discourse with others	Discuss ideas and resources with others in order to develop a thorough understanding of different perspectives.
Construct	Create something from scratch or from existing knowledge and resources.	Create an artifact (e.g., video, podcast, short written narrative) that combines existing online artifacts (appropriately acknowledged) and new components to demonstrate what has been learned.
Network	Build and maintain connections to people and resources	Follow experts and key organizations on the course topic in order to learn from and interact with them during the class and extending into the future.

(Adapted from Dennen, 2019)

and maintaining connections to both individuals and organizations. Note that while some of the activities may be completed by individuals who appear to work in isolation, engaging only with content, these activities would not be possible without the existence of online networks and can also be done collaboratively or with the end goal of sharing with a network.

Instructional designers can use the NKAs to clarify their purpose when using social media to support learning and instruction in much the same way they use Bloom's Taxonomy (Bloom, 1956) to specify learning outcomes. For example, in Scenario 1, Kris and the instructor are thinking about how to engage learners in *share* activities, with *collect* and *curate* activities serving as enablers. In Scenario 2, Jana is thinking about how she might build information networks within the company. Communication and creation activities are critical here, with the potential for individuals to *construct* materials that help them *share* their knowledge with colleagues, and for groups to *negotiate* solutions to common problems. Finally, in Scenario 3, in the near future, Monique seeks to *network* with others while she seeks to identify the spaces and people from whom she may *collect* knowledge. And later on, she may choose to interact directly with others, *negotiating* the knowledge that is being shared. Across these different activities, Kris, Jana, and Monique will find themselves relying on different features of social media, as described in Table 33.1. However, these features do not determine learning outcomes. Instead, the instructional designers determine the outcomes as they make specific choices on how to design NKA-based learning experiences and unite people and knowledge with social media.

INSTRUCTIONAL USES OF SOCIAL MEDIA

When social media is used for instructional purposes, and instructional designers invoke the NKAs and use various tool features to promote learner interaction, the learning experience naturally becomes learner-centered. Rather than relying on an instructor to provide all course content, learners may be encouraged to locate, vet, and share relevant content. Learners may find that their list of potential interaction partners expands, with social media providing access to both experts and peers who are not formally affiliated with their class. Some ways that social media can enhance familiar learning activities include:

- Lectures, where social media can host robust backchannels of communication. This backchannel communication can serve as feedback to the instructor if they choose to monitor it. It also can provide a space for learners to support each other and share resources that are relevant to the lecture.
- Guest lectures, where the possibilities for locating and inviting experts to join a class online, whether synchronously or asynchronously, are greatly enhanced.
- Class discussion, which may be enhanced when learners are able to share digital resources found in their online networks. Additionally, some learners may seek external discussion partners in online fora, gaining new opportunities for practicing their mastery of course content.
- Research projects, with social media serving as an auxiliary resource. Content from social media is not a replacement for peer-reviewed and

officially sanctioned resources published in established and reputable venues, but it can be used during a learner's brainstorming process and may expose a learner to keywords, experts, and alternative perspectives that subsequently enhance their academic exploration of a topic.

Instructional designers should not only consider how social media can fit within the parameters of existing pedagogical activities, as is shown in the previous examples, but also should explore new learning options that are facilitated by social media. For example, social media can be used to expand the spatial, temporal, and relational boundaries of a typical class. It can connect class members outside of the classroom and between class meetings, facilitating ongoing conversations, sharing relevant resources they find, and supporting timely question and answer interactions. It also can connect learners with members of other relevant groups, such as another class section, more advanced learners, or practitioners and experts in the target field.

Social media helps decenter the instructor, creating spaces where all participants equally have opportunities to communicate. Instructional designers might shift some of their focus from designing content and determining how the content will be delivered to identifying spaces and ways that learners can be encouraged to actively build a knowledge network. Learning activities like developing a shared knowledge base become possible, requiring learners to collect, curate, share, and negotiate. The example in Scenario 1 represents this type of decentering.

PROFESSIONAL DEVELOPMENT USES OF SOCIAL MEDIA

Many instructional designers turn to social media as a source of professional development. In contrast to formal professional development courses and workshops, social media-based professional development (SMPD) is usually informal, unique to the individual, learner-driven, and may be focused on meeting just-in-time needs. In order to participate in SMPD, instructional designers need to develop their professional learning networks (PLNs). These PLNs comprise people, spaces, and tools that provide them with the support they need for professional growth (Krutka et al., 2017). Each person's PLN is unique, reflecting their interests, connections, and actions. Although initially a person might maintain a relatively passive presence within their PLN, over time people who are initially consumers tend to become more active through reactions, comments, and even posting and sharing activities. This reciprocity is important for the continued existence of these networks, ensuring that a culture of mutual sharing and interaction is supported rather than a dichotomy of giving and taking.

People who have the time and inclination to build a PLN are able to reap the rewards of those networks. There are few barriers to participation in online professional networks (Trust et al., 2017), and social media is an accepted platform for professional learning and sharing both within an organization, as depicted in Scenario 2, and among people from different organizations, as depicted in Scenario 3 (Moore & Klein, 2019). Instructional designers have been among the early adopters of SMPD, and robust online communities exist through Facebook groups, Twitter chats, and aggregative spaces on other platforms. Additionally, content resources have been developed and

maintained on blogs, wikis, YouTube, and in shared repositories. Any of these social spaces might become a part of someone's PLN, and collectively they offer a wealth of support and ideas to instructional designers, as well as the instructors and learners who they support with their work.

ADVANTAGES OF SOCIAL MEDIA USE

There are two primary advantages of using social media to support learning and professional development. First, when used to engage in networked knowledge activities, social media offers new opportunities for sharing and collaboration. Whether used for formal instruction or informal professional development, people are empowered to take an active role in their learning process through their choices and interactions. Their potential interaction partners increase when the boundaries of a classroom or organization are extended, as is the ability to find authentic content and experts. Through the development of PLNs people not only address immediate learning needs but also create the connections that will support future ones.

Second, social media is self-archiving and generates user analytics. The data generated by social media interactions have many uses. Archives offer benefits to people who find and encounter them at other times, and can also identify learner needs, helpful resources, and other content-related items that are useful when designing future instruction. Analytics also indicate which communications and resources were most useful, and can provide helpful data for assessment and evaluation, too. For example, if association members interact on a social media platform during a conference, using it as a backchannel to share insights and resources, their communications can be accessed by people who were not in attendance and also will remain available at a later date. These people can revisit the conversation later, and perhaps even pick the conversation up again at a later day. Analytic data about this conversation will show not only who posted, but also how many people viewed, reshared, and perhaps even saved the post. The archives also may be used later by someone to curate a "best of" collection of resources and insights from the conference backchannel. The analytics may be used to evaluate online engagement levels of the membership and then used for future event planning.

CONCERNS AND CONSIDERATIONS

Although social media can be a powerful learning tool, it is not always an appropriate choice. Social media environments are complex, dynamic, and often public, leading to a number of concerns. Instructional designers who choose to integrate social media in their course designs or use it for SMPD should be aware of these concerns. Once aware, they can evaluate the situation and determine whether social media remains an appropriate learning technology and seek ways to mitigate their concerns.

Privacy and Intellectual Property Concerns

Many social media users have privacy concerns. Some of these concerns relate to sharing personal information online. Although legislation has been enacted

to define and protect people's information (e.g., the General Data Protection Regulation in the European Union and the Family Educational Rights and Privacy Act in the United States), legislation does not fully safeguard against privacy violations. Other privacy concerns relate to context collapse (Davis & Jurgenson, 2014), which may occur when personal social networks and learning or professional networks collide in online spaces. Although context collapse is not inherently a negative phenomenon, learners report that they prefer to keep these networks separate (Dennen & Burner, 2017). Intellectual property concerns, including the protection of proprietary content, can lead people to avoid sharing content on social media. Although no one wants their intellectual property to be stolen, social media can readily be combined with other trends like open educational resources, creating a sharing-focused knowledge economy that supports co-construction and innovation. Alternatively, learning and industry-specific software with social media-like features provides an alternative to coopting existing SNS for institutional use, alleviating privacy concerns while protecting proprietary content. These are just a few of the various strategies that instructional designers might use to help protect learner privacy and intellectual property online (see Dennen, 2015, 2016 for more thorough discussion of this issue).

Accessibility

Accessibility is another challenge when using social media for learning. SNS platform accessibility varies and is not stable. For example, when new features are introduced they may not yet work well with screen readers. Additionally, although instructional designers can promote accessibility when using social media (e.g., providing media in various formats; ensuring selected tools work with screen readers; teaching and reminding learners to use alt text when sharing media), the world at large is generally not mindful of accessibility issues. As a result, learners with disabilities may struggle to access and fully participate in some online social networks.

Digital Skills

Popular SNS may be free to use, but there is still an associated cost for effective and responsible use. Instructional designers, instructors, and learners all need to develop digital skills related to using social media before they can have productive learning and professional development outcomes. These skills include technology skills related to using different tool features confidently, but also cover social norms that govern how users interact in specific contexts and information literacy skills that help with searching for, evaluating, and organizing information resources. Instructional designers should not assume that instructors and learners already have these skills, even when those learners use social media in other contexts.

Novelty and Fatigue

When social media is used to support learning, there may be an initial novelty effect. However, that effect will not be experienced by all, and over time users might find that they experience social media fatigue. Fatigue can be

caused by multiple factors and is not necessarily related or limited to a specific use (Zheng & Ling, 2021). People who experience social media fatigue may avoid social media-based learning spaces, finding them irrelevant, tiring, and overwhelming.

Global Considerations

Social media offers the potential for global connection and collaboration, but in practice many of the networks supported by social media are bound by shared geography, citizenship, or language. These boundaries represent meaningful considerations for interaction. People are unlikely to deeply engage with each other in a learning context if they do not share language, even in the age of automated translation tools. Moreover, national boundaries and cultures, whether defined by geography or citizenship, often dictate norms and practices within a profession.

Cross-cultural exchanges remain valued in many contexts but are not always easy or possible to facilitate on some SNS. Even supposing language is not a barrier, prominent SNS vary by country, and in some countries access to certain SNS may be difficult. For example, China, which has the largest number of Internet users in the world, blocks its citizens from accessing most Western SNS via what has been dubbed the Great Firewall of China. Chinese citizens have their own social media tools and networks that can be controlled and monitored by their government. Whereas these tools promote robust engagement among Chinese citizens, they do little to promote engagement across global borders. Instructional designers with a global focus should consider these issues before selecting platforms to support their networked knowledge activities.

CONCLUSION

Social media is not just a commonly used tool in everyday life but also has become a valuable option for supporting learning interactions. With myriad potential uses, social media can easily enhance, extend, and archive learning experiences. When learners are engaged in networked knowledge activities on social media, they are empowered as active learners in the moment and also benefit by developing their digital skills and, in some cases, their PLNs. Although privacy, intellectual property, and accessibility remain among the concerns when social media is used to support learning, in many instances the benefits outweigh the challenges. Additionally, these challenges can be mitigated through careful tool selection, activity design, and thoughtful learner guidance.

Social media intersects with many other instructional technology trends. It supports learning communities, and mobile phones lead to increased anytime-anywhere access. The ability to seek learning support on demand from one's network is powerful. Additionally, the sharing-focused knowledge economy on social media enables increased creation and use of open educational resources. As the tools continue to evolve, possibilities for integrating artificial intelligence increase. In sum, social media offers instructional designers diverse and flexible opportunities to support learning.

Summary of Key Principles

1. Social media supports learner-centered instruction through engagement in a variety of networked knowledge activities. These activities can be combined to achieve desired learning outcomes.
2. Social media can be used to enhance existing learning activities by expanding the temporal, spatial, and relationship boundaries of the classroom. Instructional designers should consider how learners will benefit from interactions beyond the traditional classroom.
3. Social media-based professional development is easy to initiate. It mostly requires time and interest. It often occurs naturally, when people develop and maintain professional learning networks, but it can also be approached intentionally when specific professional development needs arise. These professional learning networks are unique to each person and can be accessed as needed for both learning and sharing.
4. Instructional designers should consider concerns such as privacy, intellectual property, accessibility, and global access when integrating social media into their learning designs.
5. Successful use of social media for learning requires a variety of digital skills focused on tools, interaction norms, and information access.

Application Questions

1. Explore social media tool affordances by choosing two or more SNS that you are familiar with. Make a table similar to Table 33.1, comparing the availability and specific characteristics and uses of different features for these SNS. Which networked knowledge activities are best supported by each of these SNS? Are there any networked knowledge activities that might be challenging to engage in on a specific SNS? Why?
2. Using paper and pen or a concept mapping tool, sketch out the different people, spaces, and tools that comprise your current PLN. Consider the role that each node in your PLN plays in your lifelong learning process. Then envision your ideal PLN at some point in the future. How would your PLN change or grow? What networked knowledge activities would you regularly use to interact in this PLN?
3. Locate a lesson plan that might be enhanced through social media use. Redesign the lesson to engage learners in networked knowledge activities, selecting appropriate social media tools to use in this endeavor. What digital skills would the instructor and learners need to have or develop in order to be successful? What challenges might arise in this learning context? What guidelines or design decisions might help mitigate these challenges?

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Artificial Intelligence (AI)

Luke Hobson

Back in the sixth grade, I was struggling to write a paper on ancient Egypt. It was a never-ending journey with going to the library, reading book after book, and still feeling like I wasn't finding the best information. I went to my neighbor's house one day after school and complained to him about how hard it was to find the information I was looking for. "Why don't you just use Ask Jeeves?" he said. I looked at him blankly and asked, "What the heck is Ask Jeeves?" Type in your question and like magic, you'll find your answers. After using it for the first time, I rejoiced and shared the website with all of my classmates. It wasn't long until our teachers saw us using this website in the school library and began asking us questions. They had concerns and fears of plagiarism and a diminution of critical thinking skills. Doesn't this sound familiar?

I feel like we are living in the Twilight Zone. Each year, a new kind of technology is introduced into our world and the general population deems these advancements as "magical" or "revolutionary." When, in reality, we've been introduced to these concepts before. Think of how the world couldn't stop talking about the Metaverse in 2021. It was pitched as a virtual space for people to socialize together in a brand new way (Zuckerberg, 2021). Any video game nerd will tell you that this concept is essentially *Second Life*, which came out in 2003. This is one example of many where an idea is rebranded and marketed to a new audience.

As instructional designers, this concept is not lost on us. A quick review of our history will tell you how a new trend will take over the field and be sold to us as magical and revolutionary. Give it about six months or so and the loud clamor begins to quiet down. Here are a few that come to mind:

- Virtual reality
- Gamification
- Simulations
- Micro-learning
- Role playing
- Experiential learning
- Cohort-based learning
- Project-based learning

- Team-based learning
- Scenario-based learning
- Flipped classroom
- Competency-based education

Now, don't get me wrong, all of the aforementioned bullet points are wonderful and, when utilized correctly, can greatly enhance a learning experience. However, to sell a concept, theory, framework, model, or process as being *the* fix to all of our needs is just not reality. It's a combination of effort, research, experimenting, practicing, applying, and evaluating that can determine what are the appropriate steps to take to create a meaningful, relevant, and engaging learning experience.

At this moment in time, artificial intelligence (AI) has now become the new "big thing." The power of AI is incredible, but saying that it will become the cure to remedy all of our instructional design ailments is a mistake. There is also a movement of concerns and fears about how to use AI, replacing common eLearning, and where this technology will take careers in our industry (James, 2023). I don't believe AI is taking over our jobs anytime soon; however, can AI become a new sidekick for you as a designer? Absolutely. AI is a kick-starter for ideas and can open new creative paths. Before we get there, though, let's define what AI actually is and then discuss best practices, real-life examples, challenges, and futures.

DEFINING AI

While AI might feel new to us, the term "artificial intelligence" was coined back in 1956 by John McCarthy, a mathematics professor at Dartmouth College (Anyoha, 2017). Since then, AI has become a part of our lives, and we often don't realize what AI is versus what it is not. So, what exactly is AI? In normal speech, AI is like giving machines the ability to think, learn, and make decisions similar to how humans do. Imagine if your computer or smartphone could understand your needs, learn from your preferences, and even predict what you might want next – all without being explicitly told to do so. That's AI at work. It's like giving a brain to machines, but one that thinks in terms of data and patterns rather than emotions and consciousness. For a more technical definition, AI refers to the simulation of human intelligence in machines, programmed to think and act like humans (Hao, 2018). This involves the creation of algorithms that allow computers to perform tasks that typically require human intelligence. These tasks can include problem-solving, pattern recognition, understanding natural language, and decision-making. AI systems can either use pre-defined rules or learn from data, with the latter often involving techniques from machine learning, a subset of AI where algorithms improve automatically through experience. For today's educators, when I say AI, what comes to mind is Large Language Models (LLMs) such as ChatGPT (GPT-3 or GPT-4) or Google Bard. These models are trained on vast amounts of text data to predict the next word in a sequence. As a result, they can generate coherent and contextually appropriate text across a wide variety of topics. These are essentially a type of chatbot (software application designed to simulate human conversation), but they are powered by one of the most advanced language models available.

INTRODUCTION TO AI

With all of this in mind, it's no wonder why instructional designers, learning designers, instructors, and all kinds of educators have been experimenting with AI to see how it can improve their learning experiences. For many educators, the first time they experimented with AI for their courses, trainings, and programs was by using ChatGPT. A friend of mine back in December of 2022 kept on telling me that I needed to give ChatGPT a chance. I dismissed it immediately thinking that it was not capable of helping out instructional designers. After enough coercing, I finally decided to give it a try.

"Draft for me five learning objectives for an instructional design graduate course," is what I entered. To my surprise, five learning objectives did appear in front of me. Now, were they perfect? Absolutely not. Three out of the five learning objectives used the terms "understand," "know," and "learn," which are all unmeasurable; however, it was a decent start. After feeding ChatGPT with information about Bloom's Taxonomy and specifically saying not to use those terms, I had learning objectives that made sense. This one experiment created a lightbulb moment in my head to see how far I could push AI into helping my designs.

Let's go through a few examples to share how AI can help with designing your learning experiences. Some of these will be simple, while others are a bit more technical. Either way, I hope that these suggestions will inspire your future designs. Remember, these ideas are meant to be kick-starters. They are never fully polished and perfect ideas. Human interaction will always be needed to make your ideas come to life.

APPLYING SCENARIOS

Scenario-based learning is a popular approach among instructional designers to use for their learning experiences. Trying to constantly create new scenarios, though, can be quite time consuming. One thing that AI does extremely well is coming up with tiny details to make the scenarios believable. If there are not enough details, the designer can simply ask for more with follow-up prompts. Next is an example of my command for ChatGPT and what it produced:

My prompt: "I'm teaching a course about organizational leadership. I want my students to work through a kind of scenario or case study about how an organization realized that their culture was in a dire state. Through innovative ways, the organization manages to make drastic changes and improve the culture. These ways should come from leadership. Can you create this for me?"

ChatGPT's Response

Case Study: Revitalizing Organizational Culture at TechFusion Corp.

Background

TechFusion Corp., a mid-sized tech company, had been a market leader in AI solutions for a decade. However, over the past three years, they faced significant competition, slowing growth, and rising employee turnover. An internal

survey revealed that employees felt disconnected from the company's vision, experienced low morale, and believed there was a lack of transparency and trust from the leadership.

The Challenge

The company's leadership team, once praised for their innovative approaches, found themselves at a crossroads. They recognized the need to address the deteriorating organizational culture head-on and instill a renewed sense of purpose, trust, and collaboration among employees.

Innovative Leadership Approaches

- **Open Forums & Listening Tours:** The CEO and leadership team initiated monthly open forums where employees could voice their concerns, ideas, and feedback without fear of repercussions. Additionally, leaders conducted "listening tours" across different departments, actively seeking feedback on what was and wasn't working.
- **Leadership Training & Coaching:** Leaders at all levels underwent rigorous training to enhance their emotional intelligence, communication skills, and understanding of inclusive leadership. This training was combined with one-on-one coaching sessions to address individual challenges.
- **Reverse Mentoring:** Senior leaders were paired with junior employees to gain fresh perspectives and insights. This initiative bridged generational and hierarchical gaps, fostering mutual respect and understanding.
- **Transparency in Decision Making:** Leadership began to share more about the reasoning behind major decisions, even if the news was unfavorable. This included sharing financials, discussing challenges, and being open about setbacks.
- **Cultural Ambassadors:** A group of employees from diverse backgrounds and departments were chosen to serve as cultural ambassadors. Their role was to keep a pulse on the organization's health, bring forth ideas, and be advocates for positive change.
- **Innovative Feedback Mechanisms:** Apart from traditional surveys, the company introduced an AI-powered chatbot where employees could anonymously provide feedback, ask questions, or voice concerns. This tool provided real-time insights into employee sentiment.
- **Celebration & Recognition:** The company introduced a platform where peers could recognize each other's efforts and successes. Monthly celebrations were organized to highlight team and individual achievements.

Outcomes

- **Employee Turnover:** Within a year, employee turnover reduced by 25%. The following year it reduced by an additional 15%.
- **Engagement Scores:** Employee engagement scores, measured bi-annually, showed a consistent upward trend. Within two years, the company achieved its highest-ever engagement score.

- **Business Performance:** With a reinvigorated workforce, the company saw a 20% growth in revenue and regained its position as a market leader.
- **Innovation:** An increase in trust and collaboration led to the launch of three new breakthrough products, conceived from ideas shared in open forums.

What would have taken hours was produced in seconds. Is this scenario perfect? No, and details will need to be modified to reflect more on what I was hoping for, but this is an excellent start.

DESIGNING SIMULATIONS

Computerized simulations have been utilized for decades, with the first one, called “Sim One,” used for educating doctors for training in endotracheal intubation and induction of anesthesia (Lateef, 2010). Simulations expanded from healthcare to the military, aviation, entertainment, education, and various other industries (Bienstock & Heuer, 2022). Simulations are common now for learning experiences, but they still can be cost prohibitive. The release of GPT-4, a version of ChatGPT released in 2023, changed this by providing the users options to be able to create their own simulations. I was curious what this could become and eagerly decided to create my own simulation.

One request I’ve been hearing from instructional design students and aspiring instructional designers is that they would love to have more practice with interviewing and day-to-day tasks. I always thought about creating my

FIGURE 34.1 Instructional designer interview simulation – task 1

Instructional Designer Interview Simulation

Task 1: Review your portfolio. Describe one of your top projects:

My favorite project was when I |

Submit

Score: 0/100

FIGURE 34.2 Instructional designer interview simulation – task 2

Instructional Designer Interview Simulation

Task 2: Research the company. What is the company's main product?

Type your answer here...

Submit

Consider providing more details about your project next time.

Score: 10/100

own simulation to mimic a day in the life of a designer or some kind of interview simulation. GPT-4 made this a reality.

Creating a simulation is a bit trickier compared to some of the other prompts. I first started with the prompt “Develop a simulation where an aspiring instructional designer is getting ready for an instructional design interview.” This prompt triggered GPT-4 to create a simulation that involved having learners engage in each of the following practice activities: create a portfolio and research an organization, participate in mock interviews (including answering technical questions and responding to hypothetical scenarios), engage in post-interview reflection, and send thank you notes. After some adjustments to the topics and entering in the feedback I would give to the aspiring instructional designer with each step, the backbone of the simulation was ready. Figures 34.1 and 34.2 are two of the screens from the simulation.

This took a bit of time to do, but creating my own simulation from scratch with such a niche topic like interviewing for an instructional design position is game changing.

BRAINSTORMING

Let’s say that as an instructional designer you are working on a design for a course and you are feeling stuck. The deadline is approaching for the next

meeting with the SME, but you're exhausted. After staring blankly at your course map for fifteen minutes, you realize that you need more help than just coffee or a break. You can probably guess where I'm going with this. Indeed, I've found that AI can greatly help you with brainstorming and getting unstuck.

For instance, I was hosting an online workshop centered around andragogy. I performed this workshop the same way every single time. I wanted to do something different to see if I could make it more enjoyable for the participants. After explaining the premise of my workshop to Google Bard, I asked for a few examples about what I could have the students do during breakout rooms. Here is what I was given:

- Case Study Analysis:
 - Prepare a brief case study of an adult learning scenario, perhaps one where there are challenges or barriers to the learning process.
 - Ask groups to analyze the case, applying principles of andragogy to propose solutions or strategies to overcome the challenges.
 - Each group can then share their solutions with the larger group for a broader discussion.
- Andragogy vs. Pedagogy Debate:
 - Divide participants into two teams: one defending the principles of andragogy and the other pedagogy.
 - Provide a scenario or a topic (e.g., "Which method is best for teaching technology to different age groups?") and let the teams prepare their arguments for a few minutes.
 - Each team presents, and then they can have a moderated debate.
- Personal Experience Sharing:
 - Ask each group to discuss and share instances from their own lives where andragogical principles were (or could have been) applied successfully.
 - They can then choose the most compelling story from their group and share it with everyone.
- Andragogy in Action:
 - Give each group a hypothetical scenario (e.g., teaching a group of adults a new software tool).
 - Ask them to design a brief lesson plan or learning activity based on andragogical principles.
 - Groups can then present their ideas, and others can offer constructive feedback.

The first thing I thought about after reading these suggestions was, "Not bad!" Every one of these has their own merit. My original idea aligned with the case study analysis. Many of these participants came from teaching backgrounds, so having a conversation around andragogy versus pedagogy was one that I hadn't considered before that could be productive. Instructional designers can use this same tactic for thinking about learning activities, assessments, and content. This could mean finding the one missing piece or ensuring that all of the design is aligned.

CREATING ROLE-PLAYING ACTIVITIES

For some topics, the significance of role playing cannot be stressed enough. Observing and listening to conversations is a good start, but more involvement

needs to take place to really drive some key points home. Some of the best professors I've collaborated with at MIT swear by role-playing activities, so they've become a part of my normal design toolkit. There are a few challenges with role-playing activities, though, especially within the world of online learning: time zone differences, communication barriers, preferred communication methods, and more. From an instructional design perspective, the most significant challenge is to actually draft a role-playing script that will align with the SME's vision.

Let's say we are looking for a role-playing script that highlights an organization securing a sponsorship. What would this look like? Here was my prompt and then the response: "I'm creating an online course about the fundamentals of negotiation. The professor wants to have his students perform a role-playing activity to learn about these fundamentals. Can you create for me a script that students can read to experience this? Let's say that the topic is around trying to secure a sponsorship."

Setting: A modern office lounge, with a round table, comfortable chairs, and refreshments. There's a promotional banner for a major event on one side.

Roles

- Jordan, the organizer of a local art and culture festival.
- Casey, the marketing director of a major company known for sponsoring community events.

Scenario: Jordan is trying to secure a sponsorship from Casey's company for the upcoming art and culture festival. The event promises significant exposure, but Casey is careful about where their company invests its sponsorship funds.

Jordan: "Thanks for your time, Casey. Our festival has grown significantly, and partnering with your company would be beneficial for both of us. We're offering a Platinum Sponsorship with prime logo placement and other perks."

Casey: "I'm familiar with the festival's reputation. However, we've got many sponsorship offers. What's unique about your event?"

Jordan: "Our festival is a community hub with workshops, live art, and over 10,000 attendees expected, largely families. This aligns with your brand, and a part of the sponsorship supports local artists."

Casey: "What's the cost for the Platinum Sponsorship?"

Jordan: "\$25,000. But considering the exposure and community engagement, it's great value."

Casey: "Could we explore a slightly reduced package for a lower cost?"

Jordan: "How about a customized Platinum package at \$20,000 with most benefits? And if we consider a multi-year deal, we could offer additional discounts."

Casey: "That sounds promising. Let's draft an agreement and discuss further."

Jordan: "Great, looking forward to a fruitful partnership."

To me, this is a good example of a kick-starter. I would absolutely change multiple lines in this script, as the wording sounds odd at times. No one would say, "I value your interest"; however, this saves time by not starting from scratch, and it would be easy to make modifications with the SME's input. The

interesting part about role-playing activities and AI is that you can request for more detail or less. It will naturally try to finish the script, but you can also ask for a cliffhanger ending. It's a useful activity in many ways.

REPURPOSING TRANSCRIPTS

Transcripts are a valuable source of information to draw ideas from. Yes, they are a requirement for videos and best practices when it comes to design, but what else can you do with transcripts? Honestly, quite a bit. For my designs, I always go back to transcripts to see what I can create with them to enhance the learning experience. For instance, introductory material, podcast scripts, key takeaway documents, and more can all come from the essence of transcripts. With AI, you can take these concepts and instantly do so much more with transcripts. Let's explore some of these:

- Discussion Prompts – Extract the key themes and thought-provoking points from the transcript to create the discussion prompts for live or online experiences
- Glossary – Identify technical terms, jargon, or specialized vocabulary from the transcript and create a glossary or “terms to know” section
- Knowledge Check Questions – Create quick learning activities for learners
- Annotations – Allow learners to annotate the transcript, adding their notes, thoughts, or questions as they go through it. This can be facilitated through certain eLearning platforms or software
- Course Material – Convert different sections of the transcript into distinct course modules or lessons
- eLearning – Convert key terms, definitions, or essential points from the transcript into digital flashcards or other forms of eLearning
- Blog Posts – Transform transcripts into simple blog posts for students to read the content to pair with the videos

These are a few that come to mind and, of course, there are several more options.

INTERPRETING AND ANALYZING DATA

Any instructional designer will tell you that a significant portion of the job is spent as a researcher. Collecting, analyzing, interpreting, and implementing feedback will always play a role in the designs of our learning experiences. There is no such thing as a perfect learning experience, and being able to incorporate our learners' voices will make the experiences better each time. The only downside to this process is time.

For some designs, the workload is manageable. Maybe there were only 20 learners taking the course and the content and assessments were already well thought out. What about if you are starting from scratch and have hundreds of learners going through the experience at once? That makes things a bit tricky. The proper way of conducting research is usually through a variety of surveys, interviews, focus groups, and observations. Once the instructional designer collects this data, it's up to them to scrub through each line, put the missing pieces together, and determine next steps. AI can tremendously

help with this by categorizing feedback, identifying common themes, prioritizing changes, and developing an action plan.

Imagine you are designing a four-week program for upcoming leaders within an organization. A pilot program is underway, and information is collected at the beginning before the learners start, at the end of each training session, and then at the end of the four weeks. You then host a focus group to ask more about the learners' thoughts about the experiences – what they enjoyed the most, what could be improved upon, etc. After the focus group, you take your notes and the survey data, remove any sensitive information, double check for privacy concerns, and then upload the data into an AI tool. You ask for the AI tool to prioritize the major themes and changes with the words that frequently appeared and to recommend suggestions on how to implement the findings.

All of these steps can be done today. However, and I'm going to stress this point, do not upload any sensitive information, especially in ChatGPT. If you have a private tool that abides by best practices with not sharing data, this is a viable strategy for analyzing and interpreting data.

INTEGRATING CHATBOTS

Chatbots aren't new within the AI space, far from it actually. Back in 2001, when everyone was using AOL Instant Messenger, a new buddy appeared on our buddy list. It was called Smarterchild. It was an AI bot designed to help users with simple questions like, "What does the weather look like today?" and "Tell me the movie times for what's playing." Of course, any millennial will tell you that most of our time spent conversing with Smarterchild was saying silly things and trying to see if we could break the robot. I think it's fair to say that Smarterchild walked so ChatGPT could run (Biancuzzo, 2023).

How do chatbots fit into learning experiences, though? In 2016, Georgia Tech's Dr. Ashok Goel, along with other faculty members and students, created a virtual teaching assistant (TA) called "Jill Watson." Jill was actually a virtual agent who was fed copious amounts of data from a computer science course in order to help with answering student questions. A student could send Jill a question through a messenger system and then receive an answer. Unbeknownst to students, Jill was an AI chatbot, and this is why she could answer questions at any time of day. According to Georgia Tech's GVU Center, "The current version of Jill automatically answers about three-fifths of student introductions in the first week of the class as well as about one third of all administrative questions about assessments in the class" (n.d.). Jill was such a great TA that she was nominated for several awards, including outstanding TA.

The idea of automating questions and answers for students and learners continues to this day. In 2023, Khan Academy launched Khanmigo to facilitate student learning using the power of AI (Khan Academy, 2023). In this same year, edX launched two AI-powered learning assistants that were developed on ChatGPT (edX, 2023). For both Khan Academy and edX, the idea is to support their learners by providing a kind of personal assistant. This assistant can help with the learning process from a customer support perspective.

The integration of chatbots into a learning management system (LMS) or learning platform is not in a faraway future. It can actually be done today. This certainly involves several stages of the product design process, including

defining the purpose of the chatbot, selecting the technology, designing the bot's interactions, and then deploying and testing everything. Platforms like Dialogflow, Microsoft Bot Framework, or IBM Watson Assistant can all perform these tasks, and they provide APIs (application programming interfaces) and other integration methods for our learning platforms.

CHALLENGES

Now that we've explored the wonders about AI, let's talk about its challenges. Using AI presents a wide range of challenges encompassing data sensitivity, privacy, and ethical considerations (MIT News, 2022). The collection, storage, and usage of data raise significant concerns about consent, security, and unintended applications. For instance, AI models can unintentionally inherit and even amplify societal biases present in their training data, resulting in unfair and perplexing decisions. The decision-making processes of many AI models are not easily interpretable, and this can leave users confused as to why they received the results they did.

Explicit trust in AI can lead to oversight, emphasizing the need for human verification in many contexts. For example, I'm sure you've read by now about ChatGPT creating fake citations. With the GPT-4 and Google Bard being connected to the internet, this fake citation concern should fade away.

Arguably, the most pressing concern with AI is how students are using it, mainly for plagiarism purposes. The truth is that at this time, there is no accurate way to detect AI writing from student writing, and this has led to false positive cases (Chechitelli, 2023). My recommendation for how to approach AI in the classroom is for instructors to openly discuss AI. Instructors should communicate about expectations, guidelines, impact, etc. (Coley, 2023). For educators who are still concerned about plagiarism, the answer is to modify assignments in a way that AI will not have the answers for. AI is only trained on the data that has been provided. If current topics are mentioned or fictitious scenarios are created, AI will not have an answer. Until AI detectors have an answer, more creativity and time will be needed for designing assessments and activities.

Another major concern about AI that is often expressed is whether it will replace the jobs currently performed by people. For my courses where I teach about instructional design, I discuss the pros and cons of AI and have students evaluate for themselves how well AI can do their jobs as instructional designers. It's always revealing to see how yes, AI can automate certain tasks, but it doesn't do so with accuracy. Inaccuracies, flaws, defects, and other kinds of errors can be seen. Just because AI says the task is finished, doesn't mean that it's well done. It's with these inaccuracies in mind that I do not believe AI will be replacing instructional designers anytime soon. I can visualize a world of AI completing basic tasks with eLearning, but for critical thinking, decision-making, creativity, empathy, and other signs of emotional intelligence with design, AI isn't close yet.

Last, but certainly not least, are concerns about regulation and copyright laws. For example, AI art generation was trained from the work of artists without their permission, therefore replicating their style to create new pieces of art. Several lawsuits have been filed since AI became a part of our everyday lives, and more will come (Walsh, 2023). Instructional designers will need to keep a careful eye on these matters.

THE FUTURE OF ID AND AI: LEARNING TRACKS

With all of these amazing advancements at our fingertips, where does this leave us? If you are asking me to look into a crystal ball and to think about the future of designing learning experiences, I'd predict that we are moving toward customized learning tracks utilizing AI, learning analytics, and adaptive learning. I know that I just mentioned quite a bit of technical jargon, so let me break down this idea more.

One undeniable fact is that students and learners come into our courses, trainings, and programs with different levels of prior knowledge and expectations. No two people are exactly going to be on the same wavelength, and it takes incredible instructors, facilitators, and designers to understand where everyone is coming from and then to support each person for their particular needs. This is a monumental task to do in a synchronous learning environment, but it's even more complicated in an asynchronous setting.

The warning signs that learners are struggling aren't apparent until the learners submit their work, hand in their work late or not at all, or they reach out for assistance. From there, the facilitator needs to explore why exactly the learners are having a hard time. It might be because the content is too challenging, but it also could very well be that learners don't find the content relevant for their needs. Perhaps they enrolled in an online course for professional development purposes, but the content and the delivery method aren't relevant for their line of work. Maybe the underlying cause is a time constraint or another barrier. Couldn't we do something to help solve these problems before they arise? My answer is yes.

As the learners are progressing inside of the learning experience, an AI tool can keep track of everything as far as time spent in the course, number of clicks, submission entries, last log in date, etc. If one of those parameters does not fit the norm, a chatbot could message the learner to see if they need assistance. Depending upon the learner's response, AI could guide them toward a solution. Imagine if the learner said that the content was too challenging. Ahead of time, the content, activities, and assessments could be stored in a database and then have three different versions created for each one. These versions would essentially be an easy, medium, or hard difficulty level, like in a video game. A new learning track would unlock with a revised way of explaining the content and providing alternatives. Once the learner feels more confident in their submissions, they could then select to move back to the original learning track.

The entire time the learner is going through the learning process, AI is learning about them. This could be used to create customized and individualized learning approaches for learners. For adult learners, we know that flexibility, autonomy, and freedom are key for motivation, retention, engagement, and creating a sense of purpose. This is where, I believe, we are heading toward. Are there limitations to this? Of course. It will take a significant amount of time, energy, and resources to make this a reality. For those in higher education, this can present challenges with the accreditation process, data sensitivity, intellectual property, and other factors. It's not a perfect solution, but it's a start.

Once again, there is no magical universal way that will always improve our learning experiences. The commotion and unrelenting posting on social

media about AI have made this into the next big thing that some will love and others will find steadfast concern or displeasure in. As long as we carry on the conversations about the pros and cons and usages of AI in our instructional design world, we will continue to move the needle in the right direction.

Summary of Key Principles

1. **There isn't a singular solution that will work for every learning experience.** AI is another strategy that can enhance a learning experience, but it should not be relied on as the only strategy.
2. **AI is a kick-starter for ideas.** A human's critical thinking and analytical skills will always be needed to take the ideas to their full potential.
3. **AI can be used for designing specific elements of learning experiences.** ChatGPT, Google Bard, and others are proficient with designing scenario-based assessments, simulations, role-playing scripts, and more.
4. **AI is effective at analyzing and interpreting data to discover themes and next steps.** To save time with data analysis, AI is an optimal solution.
5. **AI comes with challenges.** AI is nowhere close to perfect and needs to be used with caution.
6. **AI could greatly enhance the future of designing learning experiences.** Learning tracks consisting of AI, learning analytics, and adaptive learning could create individualized ways of learning.

Application Questions

1. With the rise of AI in various sectors, the field of instructional design is no exception. A leading eLearning company called "LearnTech" is at a crossroads, considering the potential benefits and challenges of AI integration. A senior instructional designer at LearnTech recently discovered the transformative potential of AI in eLearning. This technology promises individualized learning experiences, real-time feedback, and targeted recommendations. Keen to innovate, the senior designer proposed integrating AI into their next project, envisioning adaptive courses and anticipatory support systems. The team's response was mixed. One team member, with a strong foundation in traditional learning, questioned: "Will AI compromise the essential human touch in our courses?" Another, more pragmatic designer asked, "Do we have the necessary resources and expertise for such a transition?" Conversely, a newer team member saw it as the inevitable future: "This could redefine our industry. We should be on board." With an upcoming project deadline and a divided team, the pressure was palpable. The senior designer believed AI could elevate their company above their competitors. However, the team's concerns about implementation, resources, and preserving the essence of learning were genuine. With leadership expecting a groundbreaking proposal, the stakes were high, and a unified direction was essential.

How can the instructional design team initiate an AI pilot, address the team's concerns, harness the technology's promise, and meet company expectations?

2. Think about your own organization's wants, needs, and goals. Could integrating AI into your design flow improve these outcomes? Why or why not?

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Designing for E-Learning

Ruth Colvin Clark and Richard E. Mayer

WHAT IS E-LEARNING?

We define e-learning as instruction delivered on a digital device that is intended to support learning. Typical digital devices for e-learning include desktop computers, laptop computers, tablets, smartphones, smart watches, and virtual reality head-mounted displays. While there are multiple ways to analyze e-learning, for the purposes of this chapter we distinguish between synchronous and asynchronous e-learning, instructor-paced and learner-paced lessons, and among six common e-learning formats. Our goal in this chapter is not to repeat guidelines available in many how-to resources, but instead to illustrate how effective e-learning relies on implementing evidence-based design principles that promote the psychological processes of human learning and performance.

Synchronous Versus Asynchronous Formats

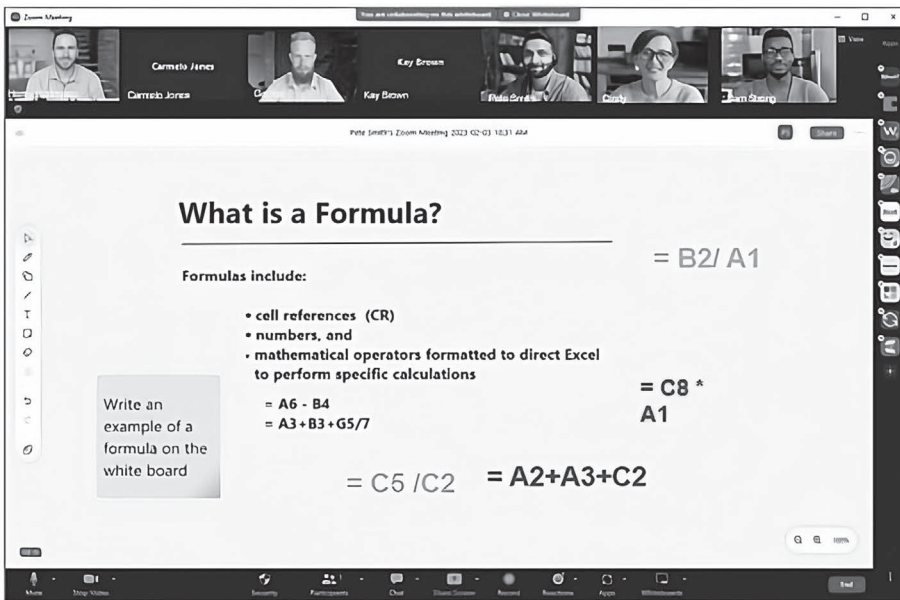
In Table 35.1 we summarize the main features distinguishing synchronous from asynchronous e-learning. Specifically, synchronous learning occurs when a learner participates in a live, instructor-led lesson at a predetermined time along with the rest of the audience, such as attending a Zoom lecture.

TABLE 35.1 Synchronous Versus Asynchronous E-Learning

TYPE	DESCRIPTION	FEATURES
Synchronous E-Learning	Digital instructor-led lessons intended for groups of learners participating at the same time using software such as Zoom or MS Teams. See Figure 35.1.	Higher social presence Instructor-paced Higher completion rates Less flexible across time zones
Asynchronous E-Learning	Digital instruction intended for on-demand, individual, learner-paced use generally involving pre-recorded videos or slides described with text or audio narration. See Figure 35.2.	Lower social presence Learner-paced Lower completion rates Flexible across time zones

The learning is synchronous because the instructor and learners are together at the same time. In contrast, asynchronous learning occurs when a learner accesses a pre-recorded online lesson at a time of their choosing and views it alone, such as viewing a pre-recorded video lecture. The lesson is asynchronous because the instructor and students are not together at the same time.

FIGURE 35.1 A screen capture from a synchronous Excel tutorial e-lesson



Clark and Mayer (2024)

FIGURE 35.2 A screen capture from an asynchronous Excel tutorial e-lesson

Course Menu

- Course Introduction
- Naming Cells
- Formulas**
- Copying Formulas
- Absolute Cell Reference
- Application Case Study

Audio ☒ Off ☐ On

Using Spreadsheets in your Small Business

Lesson 2: Working with Formulas

Clipboard Font Alignment

SUM X ✓ *fx* =B6*.06

	A	B	C	D	E	F
1	Pete's Pet Emporium					
2						
3	Month	January	February	March	April	
4	Sales	\$60,000	\$84,000	\$80,000	\$92,000	
5	Overhead	\$40,000	\$32,000	\$35,000	\$45,000	
6	Profit	\$20,000				
7	Bonus percentage	=B6*.06				
8						
9						

Play >

All Excel formulas begin with an equal sign. Formulas also can include cell references, mathematical operators, and numbers. Using a cell reference allows you to quickly update your calculations when your data changes. Click on the play button on the spreadsheet above to see a short demonstration.

< Previous
Next >

Clark and Mayer (2024)

Instructor-Paced and Learner-Paced Formats

The distinction between synchronous and asynchronous formats is not only important from a practical perspective but also shapes the effectiveness of many evidence-based e-learning design principles. An important difference is that synchronous formats usually are instructor-paced and asynchronous formats usually are learner-paced. For example, many of our design principles apply more to instructor-paced formats such as virtual classrooms, which often dispense content in a fast-paced manner that can lead to mental overload compared to learner-paced formats that usually allow learners to access and review content at their own pace.

Six E-Learning Instructional Formats

As hardware and software have evolved, we see ongoing diversity in e-learning instructional formats. Although there are no universal categories, we summarize six common e-learning instructional formats in Table 35.2. Note that these formats are not mutually exclusive. For example, most of the formats can incorporate tutorials as one element. Tutorials represent a predominant form of e-learning and are illustrated in the synchronous and asynchronous Excel lessons shown in Figures 35.1 and 35.2, respectively. A typical tutorial includes brief explanations, examples, practice exercises, and feedback. A tutorial can incorporate narrated animations, narrated illustrations, printed text, and graphics (e.g., an e-book), or interactive lessons with feedback.

TABLE 35.2 Six Common E-Learning Instructional Formats

FORMAT	DESCRIPTON
Tutorials	Short instructional units that typically include explanations, examples, practice, and feedback. May be asynchronous or synchronous.
Virtual Classrooms	Instructor-led online learning units using tools such as Zoom or MS Teams. Synchronous, although recordings can usually be reviewed asynchronously.
Video Lessons	Usually instructor-led short video lessons, often in the form of brief tutorials, such as many available on YouTube. Usually intended for asynchronous viewing. May be used for purposes of learning or performance support.
Games	Interactive online environments intended to build knowledge and skills. Typically involve a goal, feedback, and rewards. May be designed for solo or collaborative play and may be synchronous or asynchronous.
Simulations	Interactive online environments in which learners take action and experience consequences. Generally designed to emulate real-world processes or procedures.
Immersive Virtual Reality (IVR)	A digital environment in which learners are immersed in a computer-generated 3D world typically by using a head-mounted display device.

As bandwidth and software have evolved, virtual classrooms and asynchronous video lessons commonly viewed on YouTube make up two additional e-learning formats. YouTube has roughly 1.5 billion monthly users who collectively view more than 1 billion hours of video a day (Wikipedia). Two YouTube categories in particular – *How to* and *Education* – are devoted to knowledge- and skill-building videos. A fourth common e-learning format is learning games designed to leverage the enormous popularity of online entertainment games for instructional purposes. Highly interactive with almost continuous feedback, digital games may be part of a larger instructional unit or may be stand-alone.

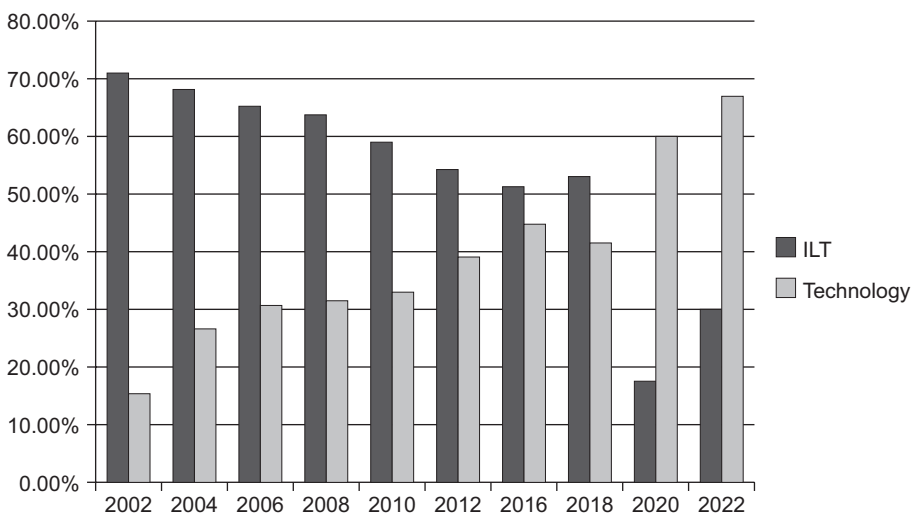
Simulations are another common e-learning format often used to demonstrate and practice skills ranging from software procedures to problem-solving tasks. You have probably read about the emphasis that many technology companies are putting on 3D immersive environments. Immersive virtual reality (IVR) learning environments are an emerging format and have been used for purposes ranging from surgical procedures and safety training to decision-making skills. At the end of this chapter we focus on IVR to illustrate what kinds of questions instructional professionals should consider regarding the use of new technology for instruction.

THE EVOLUTION OF E-LEARNING FOR TRAINING

About 25 years ago, e-learning accounted for only around 11% of training media delivered primarily on CD-ROMs or organizational mainframe computers. As bandwidth and connectivity grew, inter- and intranets supported delivery of consistent courseware that incorporated rich graphic displays, audio, and opportunities for engagement with instructors, colleagues, and the courseware.

As summarized in Figure 35.3, digital learning experienced gradual but steady growth throughout the first two decades of the twenty-first century,

FIGURE 35.3 Percentage of learning hours available via instructor-led classroom (ILC) and technology



Based on ATD State of Industry Reports 2014, 2023.

accounting for about 40% of all training delivery just prior to 2020. Then came COVID-19. The pandemic exerted a major disruptive effect on in-person training, resulting in dramatic growth in e-learning. As millions of staff worked remotely, computer technology became the main conduit for training. Although still in a state of post-pandemic transition, e-learning was boosted to close to 70% of all training delivery in 2022. Not surprising, many former in-person classroom events transitioned to virtual classroom formats.

TECHNOLOGY-CENTERED VERSUS LEARNER-CENTERED INSTRUCTION

Today, you have access to an impressive and ever-evolving arsenal of instructional technologies ranging from educational games played on mobile devices to virtual reality environments to virtual classrooms. Take a look at the following questions about learning with technology and place a check mark next to *the one* you think is most important:

- How can you integrate cutting-edge technology into training?
- How can you leverage technologies that younger generations have grown up using?
- What are the best technologies for e-learning?
- How can you best adapt technology to aid human learning and performance?

If you checked any of the first three items, you may be taking a technology-centered approach to learning with technology. In a technology-centered approach you focus on the capabilities of educational technology such as social media and immersive graphics in an effort to promote learning with technology (Mayer, 2021).

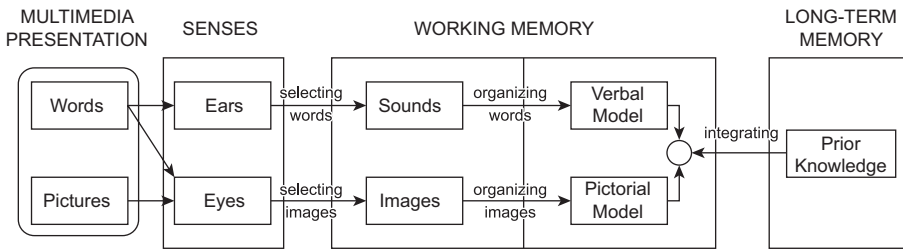
What's wrong with this view of learning with technology? The problem is that when you focus too much on the role of the latest technology, you may ignore the role of the learner.

If you checked the last item, you are taking a learner-centered approach to learning with technology. In a learner-centered approach the focus is on how people learn and technology is adapted to the learner to assist the learning process (Mayer, 2021). The rationale for taking a learner-centered approach is that it has been shown to be more effective in promoting productive learning. A learner-centered approach does not rule out the use of new technological innovations. It does, however, require the adapting of those innovations in ways that support human learning processes. In this chapter, we recommend a learner-centered approach, so we begin with a brief summary of how learning works.

HOW LEARNING WORKS

Figure 35.4 summarizes a model of how learning works based on research on the science of learning (Mayer, 2021, 2022). Consider what happens when you are presented with a multimedia lesson. In the left column, your lesson may contain graphics (in static or dynamic form) and words (in printed or spoken form). In the second column, the graphics (pictures) and printed words enter your cognitive processing system through your eyes, and spoken words enter

FIGURE 35.4 Cognitive theory of multimedia learning



Adapted from Mayer (2022).

through your ears. If you pay attention (indicated by the *selecting words* and *selecting images* arrows), some of the material is selected for further processing in your working memory, where you can hold and manipulate just a few pieces of information at one time in each channel. In working memory, you can mentally organize some of the selected images into a pictorial model (as indicated by the *organizing images* arrow) and some of the selected words into a verbal model (as indicated by the *organizing words* arrow). Finally, as indicated by the *integrating* arrow, you can connect the incoming material with relevant existing knowledge from your long-term memory – your storehouse of knowledge. A core part of the job in designing and developing instruction for e-learning is to guide how the learner selects, organizes, and integrates information during learning.

CORE GOALS FOR INSTRUCTIONAL DESIGN IN E-LEARNING

The challenge for the learner is to carry out these processes within the constraints of severe limits on how much processing can occur in each channel of working memory at one time. You may recall the expression from a classic paper by Miller (1956): “Seven plus or minus two.” This refers to the capacity limits of working memory – that is, people can generally think about only a few items at any one time. They can hold a few images in the visual channel in working memory and a few phrases in the verbal channel in working memory. Not only is capacity limited but unless further processing takes place, new information in working memory is lost within a few seconds. The limited capacity of working memory creates three kinds of demands on the learner’s cognitive system during learning (Mayer, 2011, 2021, 2022; Paas & Sweller, 2022; Sweller et al., 2011):

1. *Extraneous processing* is cognitive processing that does not support the instructional objective and is created by poor instructional design decisions (such as incorporating extraneous text and irrelevant graphics).
2. *Essential processing* is cognitive processing that is influenced primarily by the complexity of the content; content of higher complexity (for the learner) will impose greater essential load.
3. *Generative processing* is cognitive processing aimed at a deeper understanding of the core material (consisting mainly of organizing and integrating) and is created by the motivation of the learner to make sense of the material and can be supported by instructional methods that promote engagement with the material.

TABLE 35.3 Approaches to Manage the Challenges of Mental Load

Challenge	Description	Solution	Examples
Too much extraneous processing	The mental load needed for extraneous and essential processing exceeds mental capacity.	Reduce extraneous processing: avoid instructional methods that impose excessive extraneous processing.	– Minimize the use of decorative graphics. – Write lean text and audio narration scripts.
Too much essential processing	The content is so complex that it exceeds mental capacity.	Manage essential processing: use techniques to reduce content complexity or distribute content over audio and visual channels.	– Use audio to explain graphics. – Segment content into small chunks. – Provide pre-training on key terms.
Insufficient generative processing	The learner does not engage in deep processing to result in understanding.	Promote generative processing: incorporate techniques that promote psychological engagement with the content.	– Add practice activities. – Ask learners to generate summaries or drawings. – Add relevant visuals.

As summarized in Table 35.3, effective instructional design manages the challenges presented by these three forms of cognitive load.

EVIDENCE-BASED DESIGN

Recently we reviewed a number of evidence-based design principles you can use to maximize the benefits of e-learning (Clark & Mayer, 2024). In the sections to follow we describe exemplary instructional principles you can apply to reduce extraneous load, manage essential load, or promote generative processes. These guidelines are based not only on the learning processes we described previously but also on evidence from experimental research studies. Experimental results are the basis for evidence-based design. In a valid experimental study, learning from two or more lessons is compared – one lesson includes the instructional method of interest, while the other lesson is identical minus the method being evaluated. For example, the designed lesson explains a scientific process with text and graphics, while the control lesson explains the process with text alone. Individual learners are randomly assigned to one of the lesson versions and then take a post-test after completing the lesson. In addition, often student ratings of interest and enjoyment are measured to assess the motivational value of the instructional method being evaluated.

While the results of one or two experiments can offer some design guidance, after many experiments are published, we have access to more robust guidelines based on a synthesis of these experiments using a technique called meta-analysis. In a meta-analysis researchers calculate effect sizes, which provide a common indicator of the relative impact of the method being studied. For example, a lesson with text and graphics may have an effect size of 0.60 compared to the same lesson without graphics. This means that the designed group scores 0.60 standard deviations better on the posttest than the control group. As a general guideline, we look for effect sizes greater than 0.40 as an indication that the instructional method is worth implementing.

In addition to calculating effect sizes, researchers can categorize the experiments based on features of interest to determine specific conditions under which the methods are most effective. For example, they might compare effect sizes of lessons with graphics added for novice learners with the effect sizes of lessons with graphics added for learners who have experience with the content. The specific context in which an instructional method is and is not effective is called a boundary condition. In summary, we can use effect sizes to decide whether a given method is worth implementing, and we can use boundary conditions to define the conditions under which that method is most effective.

In the next sections of our chapter we illustrate the evidence and psychological processes underlying one exemplary method shown to minimize extraneous load, manage essential load, and promote generative load.

E-LEARNING METHODS TO MINIMIZE EXTRANEOUS MENTAL LOAD

E-learning offers many opportunities for rich media replete with animations, video, still graphics, immersive graphics, printed text, audio narration, and sound effects. In fact, technology can project more information than the learner's brain can process. You might be tempted to embellish lessons in an effort to motivate learners. For example, to counter high e-learning drop-out rates, some designers attempt to spice up their materials by adding entertaining or motivational elements such as dramatic stories, interesting pictures, or background music. In general, the cognitive costs of these well-intentioned additions exceed the motivational gains. When learners use their limited processing capacity on extraneous material, less capacity is available for making sense of the essential content.

Evidence for Omitting Extraneous Content and Effects

What happens when entertaining but irrelevant video clips are placed within a narrated animation? Mayer et al. (2001) asked students to view a three-minute narrated animation on lightning formation with the addition of video clips intended to make the presentation more entertaining, yielding a total presentation lasting four minutes. The added video clips showed interesting but irrelevant information, such as injuries from lightning strikes. The added video clips were related to the general topic of lightning but were not intended to help explain the cause-and-effect chain in lightning formation.

Students who received the lightning presentation *without* the inserted video clips performed better on solving transfer problems than students who received the lightning presentation with inserted video clips – producing about 30% more solutions, which translated into a high effect size of 0.86. Mayer et al. (2001, p. 187) note that this result is an example of “when presenting more material results in less understanding.”

Two meta-analyses have found similar benefits for omitting extraneous visuals. Rey (2012) reported an effect size of 0.48 for lessons that omitted extraneous visuals. Sundararajan and Adesope (2020) conducted a meta-analysis of 68 experiments comparing learning from materials that included, versus materials that omitted, extraneous visuals. They reported an overall effect size of 0.33 for omitting extraneous visuals.

E-LEARNING METHODS TO MANAGE ESSENTIAL MENTAL LOAD

When the lesson content is complex, the amount of essential mental load may exceed the learner’s capacity to process it. One technique to manage the amount of content learners must process is to describe complex visuals with audio narration rather than printed text. We call this technique the modality principle. For example, in Figure 35.5 you can see a sample of three screens from the lightning lesson in which the words are presented in audio narration (top row) versus the same screens in which the words are presented in printed text captions (bottom row). Across 33 experiments, people scored higher on posttests when lessons contained graphics with audio narration rather than graphics with printed onscreen text, yielding an average effect size of 0.88 (Mayer & Fiorella, 2022).

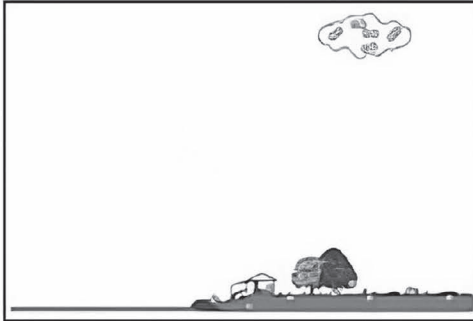
As we described previously, working memory has two channels for information: a visual channel and an auditory channel. When a complex and fast-moving visual such as an animation is described with text, there is too much visual information for the learner to absorb. If the learner reads the onscreen text, they will miss some of the animation, and if they attend to the animation, they will miss some of the onscreen text. To overcome this limit, you can off-load the words from the visual channel to the auditory channel by using audio rather than onscreen text. In short, we can use both the visual and the auditory channels and thereby divide the content between the two.

When Audio Is Not Effective

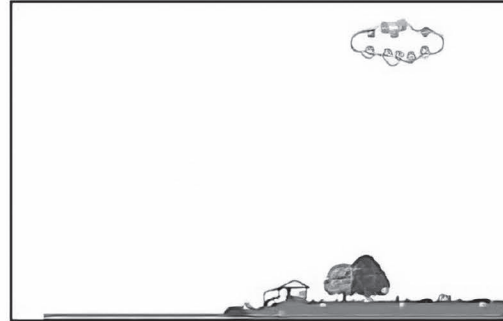
There are some boundary conditions that qualify our recommendation to present words in audio narration. Because information decays rapidly in working memory, a lengthy narration may not benefit learning. Therefore, the modality principle recommends audio narrations be kept brief.

Secondly, if the words are unfamiliar to the learner, presenting them in transitory audio may degrade learning compared to presenting them in text. It is not surprising that learning is generally better for second language learners when the words are presented as onscreen text rather than audio. Lee and Mayer (2018) compared learning from a 16-minute video lesson on Antarctica among 374 Korean-speaking college students who had basic English literacy

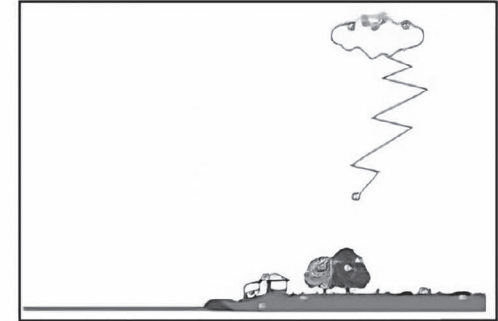
FIGURE 35.5 A lesson on lightning formation with words presented in audio narration (top row) versus the same lesson with words presented in onscreen text (bottom row)



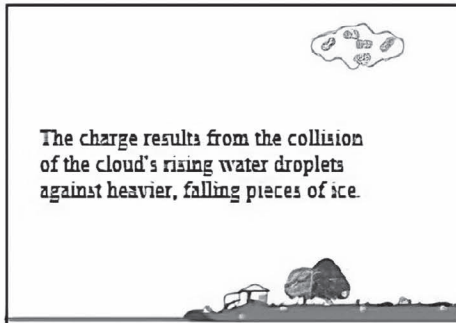
"The charge results from the collision of the cloud's rising water droplets against heavier, falling pieces of ice."



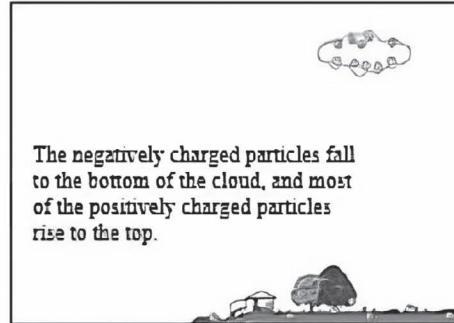
"The negatively charged particles fall to the bottom of the cloud, and most of the positively charged particles rise to the top."



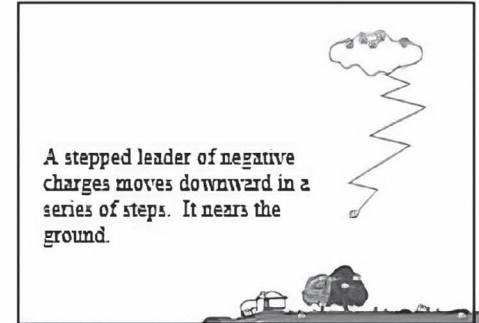
"A stepped leader of negative charges moves downward in a series of steps. It nears the ground."



The charge results from the collision of the cloud's rising water droplets against heavier, falling pieces of ice.



The negatively charged particles fall to the bottom of the cloud, and most of the positively charged particles rise to the top.



A stepped leader of negative charges moves downward in a series of steps. It nears the ground.

Adapted from Mayer and Fiorella (2022).

skills. Three versions were compared: (1) video with English narration, (2) video with English subtitles (no narration), and (3) video with English narration and English subtitles. The version that included English subtitles and no narration led to the best learning. This result was confirmed by a meta-analysis reporting the large effect size of 0.99 for captioning second-language videos (Noetel et al., 2022). In conclusion, the modality principle enhances learning when the narration is brief and when the words are familiar to the learner.

E-LEARNING METHODS TO PROMOTE GENERATIVE MENTAL LOAD

Engagement that leads to generative processing is at the heart of all successful learning episodes. We define engagement as meaningful psychological interaction between the learner and the instructional environment that promotes the achievement of the learning goal. Engagement may support building relationships between new content and prior knowledge and/or among content elements in the lesson.

In designing effective instruction, be on the lookout for learning activities that will foster this kind of engagement. In their chapter on generative activity, Fiorella and Mayer (2022) describe the eight evidence-based learning activities we summarize in Table 35.4 that have been shown to promote generative learning. As you can see, the generative learning activities are divided into verbalizing activities such as self-explaining, visualizing activities such as drawing, and enacting activities such as manipulating real or virtual objects. Each learning activity promotes engagement with lesson content – although some activities, such as self-explaining, may occur covertly in the absence of overt physical activity.

TABLE 35.4 Eight Generative Learning Activities

STRATEGY	WHAT THE LEARNER DOES	TYPE OF GENERATIVE ACTIVITY
Summarizing	Creates a written or oral summary of the material in the lesson.	Verbalizing
Mapping	Creates a spatial representation of the key ideas in the lesson.	Visualizing
Drawing	Creates a drawing that depicts the key material in the lesson.	Visualizing
Imagining	Imagines a drawing that depicts the key material in the lesson.	Visualizing
Self-testing	Gives themselves a practice test on the material in the lesson.	Verbalizing
Self-explaining	Creates a written or oral explanation of portions of the lesson.	Verbalizing
Teaching	Explains the material in the lesson to others.	Verbalizing, Visualizing, Enacting
Enacting	Acts out the material in the lesson.	Enacting

Adapted from Fiorella and Mayer (2022).

A common element in these generative learning activities is the intention that learners will transform the instructional material into their own mental representations. For example, a learner may be asked to type an explanation of the content they view in a narrated animation, or even to create a video to teach back the content to others. These explanations will include elaborations or inferences not present in the lesson. Alternatively, learners may create a knowledge map or a drawing based on a text lesson. In these examples learners transform the lesson materials into their own unique representations.

Engagement in e-learning can involve behavioral activities such as clicking on an onscreen object, participating in a Zoom discussion, typing a response to a question, or posting a comment to a discussion board. Productive engagement can also occur in the absence of overt physical activity. For example, when reviewing an explanatory diagram or reading text, psychological processing supports learning. The advantage to a behavioral response is a visible product that can benefit from feedback. Sometimes, however, a behavioral response does not lead to learning. Three conditions in which assigned activities can be counterproductive include:

1. The activity requires too much extraneous mental load, leaving no capacity for generative processing. For example, a learning game can require activities that are extraneous to the instructional goal. While the challenge of a game can be motivational, it's important that activities required to meet the challenge are congruent with learning goals.
2. The activity results in an inaccurate representation of content. For example, in response to a drawing assignment, the learner produces an incomplete or inaccurate drawing.
3. The activity leads to shallow processing of the lesson content. For example, a question requires the learner to type in the verbatim steps to complete a task rather than actually completing the task.

We recommend that you design behavioral activities that promote work-relevant generative processing while minimizing extraneous mental load, ensuring accurate learner representation of learning content and minimizing shallow processing of content. It's important to ensure that learners have sufficient instructional support to complete an activity and feedback that confirms or corrects their outcomes.

EVIDENCE-BASED METHODS APPLIED TO EMERGING TECHNOLOGY

As technology evolves, instructional professionals are interested in applying new digital features to enhance learning outcomes. For example, one recent technology that has potential for training is immersive virtual reality (IVR). Immersive virtual reality (IVR) is a digital technology in which learners are immersed in a computer-generated 3D world, typically by using a head-mounted display such as Oculus Quest or HTC Vive. Depending on the technology and software design, students can look around, move around, and/or manipulate virtual objects. Compared to traditional e-learning on a computer screen, immersive environments give learners a sense of being present via stereoscopic visuals, higher-resolution displays, 360-degree views, and the ability to move in the environment.

FIGURE 35.6 A screen shot from an IVR guided exploration experience

Adapted from Makransky and Mayer (2022).



As an example, a science inquiry IVR shown in Figure 35.6 immerses the learner in Greenland, where they can explore, take samples, and go forward or backward in time to see the changes in glaciers. The goal of the simulation is to experience the effects of climate change on the environment. After a period of guided exploration in the virtual world, student teams are asked to present a brief oral report summarizing their findings and conclusions (Makransky & Mayer, 2022; Petersen et al., 2020).

When faced with new technological capabilities, such as those available in IVR, we look to evidence to answer the following questions:

1. Is IVR more effective for learning than traditional formats, such as standard e-learning 2-D tutorials?
2. Is IVR more motivational than traditional e-learning?
3. Are there some instructional outcomes that are better suited to the features of IVR than others?
4. How can we design IVR to minimize extraneous load, manage essential load, and promote generative learning processes?

Research on IVR is just emerging, but we have sufficient evidence to begin to answer these questions.

Is IVR More Effective and Motivational?

To answer this question, researchers conduct media comparison experiments. In these experiments learning and motivation from an IVR lesson are compared to learning and motivation from the same content presented with a different medium, such as an instructional video or e-learning tutorials. For example, Parong and Mayer (2018) evaluated learning of human biology concepts presented in IVR compared to a slideshow presentation. One group used a virtual reality lesson in which the learner could travel through the human

bloodstream while a narrator explained the purpose of the various cells they encountered. A comparison group viewed the same content via a slideshow lesson using screenshots and the same words as in the narration from the IVR version. Which version led to better learning? The slideshow group learned significantly more than the IVR group. However, a comparison of lesson ratings found learners felt happier, more excited, and less bored in the IVR versions. While learning was *not better* in IVR, motivation was.

Since the 2018 IVR biology lesson study, additional research has been reported, and we have benefited from a number of media comparison studies comparing IVR lessons with the same lessons in more traditional formats. Based on 52 comparisons in 23 studies, Parong (2022) found a median effect size of 0.10, showing that students who learned in IVR scored only negligibly higher than those who learned with conventional media. Of 52 comparisons, 31 showed higher learning outcomes for IVR compared to control groups, while 21 showed lower or equivalent learning. In a meta-analysis of 35 studies, Wu et al. (2020) reported a small effect size of 0.24 favoring learning in IVR, but the effect was much lower when learning in IVR was compared to other forms of e-learning on a computer screen. Overall, evidence slightly favors the use of IVR over traditional methods, but the large range of effects suggests that other factors may impact effectiveness. The benefits of IVR may depend on the desired learning outcomes and how the IVR program is designed, among other factors. Let's take a look at some of the factors that have been shown to affect the instructional utility of IVR learning experiences.

How and When to Use IVR

Two important questions regarding any new technology are (1) when does that technology offer advantages over other platforms and (2) how to use new technology in ways that minimize extraneous load, manage essential load, and promote generative processing. When considering whether to replace or augment a curriculum or training program with IVR, ask yourself: When do the advantages of IVR align well with your learning goal, and what methods should be used to optimize learning and motivation? Regarding when, with its immersive and interactive capabilities, because IVR is a type of simulation, it may be an appropriate choice in environments that would be impractical or unsafe to use in the real world. For example, training goals involving safety practices, responses to emergencies, or application of soft skills may benefit from the high fidelity of an IVR experience. Additionally, when motivation to learn and to apply learning outcomes is a priority, IVR may offer significant advantages.

If your organization decides to use IVR, what techniques might optimize learning with this technology? To find out we turn to value-added research in which researchers compare two versions of an IVR lesson. One IVR version includes a method to be tested and is compared to the same IVR lesson minus that method. The goal is to identify instructional principles that make up for potential barriers to learning, such as too much extraneous load and/or principles that promote productive engagement with the environment.

As we discussed previously, complex visual environments are more likely to bog down learning by imposing extraneous cognitive processing. In addition, a high level of learner control allowing freedom of visual perspective, motion

in the virtual environment, and interaction with virtual objects represent additional potential sources of extraneous cognitive processing. In their research comparing learning of biology concepts in IVR to learning from a slideshow presentation, Parong and Mayer (2018, 2021) noted that participants in the IVR group were more likely to mention being distracted or having a hard time focusing on the instructional narration than participants in the slideshow group. Value-added research has found that adding pretraining on lesson concepts as well as pausing the IVR lesson periodically can lead to better learning outcomes. Specifically, pretraining that explains the main lesson concepts prior to the lesson as well as periodic pauses that segment the lesson content have both been shown to improve learning by reducing essential load (Mayer & Fiorella, 2022).

Our second recommendation is to promote generative processing by asking learners to generate short summaries during breaks in an IVR lesson. In a value-added experiment, learning from a continuous version of the biology lesson mentioned previously was compared to an alternative version that paused the IVR lesson periodically and asked learners to summarize what they learned in that section (Parong & Mayer, 2018). Learning in the segmented-generative version was better than learning in the continuous version. The good news is that segmenting and adding summarization assignments did not diminish student satisfaction ratings. We conclude that summarizing can be an effective learning activity during pauses in an IVR lesson.

ADAPTING NEW TECHNOLOGY FOR LEARNING: THE BOTTOM LINE

We have used recent research on an emerging technology (IVR) to illustrate how media comparison research studies and value-added research studies can guide our use of any new technology. In particular, we advocate taking an evidence-based approach to decide when to use a new technology and how best to design it to align with psychological learning principles. By so doing you are taking a learner-centered rather than a technology-centered approach.

Summary of Key Principles

To optimize learning outcomes from e-learning we recommend that you:

1. Design lessons or experiences that manage mental load by using methods that:
 - a. Minimize extraneous mental load
 - b. Manage essential mental load
 - c. Optimize generative learning processes
2. Use instructional methods that support the main cognitive learning processes:
 - a. Direct attention to important content
 - b. Support organization of visuals and words into a unified mental model
 - c. Support integration of new content with existing knowledge in long-term memory
3. Take an evidence-based approach to design by leveraging methods shown in controlled experiments and meta-analyses to promote learning.
4. Consider how the features of new technology can be optimized to achieve instructional goals that can benefit from those features.

Application Questions

Your boss, the HR director, has just returned from an e-learning conference and is excited to impress senior management with cutting-edge technology. She has asked you to create a new learning experience for all staff focusing on diversity and inclusion using immersive virtual reality. “Let’s show that we are on top of the leading edge of technology in this important training initiative that all staff will be required to complete. I’ve already prepared a budget to order a large number of headsets for staff to use in training.”

1. Your boss seems to be taking a technology-centered approach. However, before jumping into this project, what are some questions you want to address that might reflect a learner-centered approach?
2. Before making a large investment in new technology, what are some of the cost–benefit tradeoffs to consider?
3. How do you think you will evaluate the outcomes of this training effort?

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Designing Educational Videogames

Balancing Learning, Assessment, and Fun

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Humans have been using and researching the power of games for learning for centuries: chess was used to teach war strategy in the Middle Ages (Institute of Play, n.d.), and games formed the basis of early childhood education (e.g., Kindergarten; Fröbel, n.d.). The use of games for educational purposes increased with the advent of digital games (games played on a computer or dedicated game console) like *Oregon Trail* in the 1980s and 1990s (Rawitsch et al., 1971; Bouchard, 1985) and *Sim City* (Wright, 1985) in the 2000s. Research has also shown that educational videogames (EVGs) can be very effective learning tools: meta-analyses of EVGs have found that they can result in a 0.33 standard deviation improvement in learning when compared to non-game-based instruction and that theoretically augmented (i.e., well-designed) EVGs account for a 0.37 standard deviation increase in learning when compared to nonaugmented games (Clark et al., 2014).

Despite this increased interest in using and studying videogames in schools, evidence suggests that they are not being used to their full potential. Nearly 75% of K–8 teachers report using digital games in their classrooms, and more than 40% of them were doing so to meet local, state, and national standards (Takeuchi & Vaala, 2014). Yet, the vast majority are using what have sometimes been described as “drill and kill” games that focus on lower-level taxonomic outcomes (verbal information and concepts, in Gagné’s taxonomy [Gagné et al., 2004], and knowledge and application in Bloom’s taxonomy [1984]) that can be accomplished in a single classroom session. We argue that there are many instructional strategies and modalities that can address lower levels of learning as, or perhaps more, effectively than EVGs and at much

lower cost. The true advantage of videogames as a medium is their potential to address *higher* levels of learning (e.g., rules and problem solving or synthesis and evaluation) along with other outcomes that are traditionally difficult to address (e.g., attitudes and metacognitive skills).

The reader is (or will soon be!) competent to search the now extensive literature on games and learning. Doing so is an essential step on the journey to becoming competent as an instructional designer who wants to build EVGs for learning. Our goal in this chapter is to address what we see as a significant gap in the literature regarding the design process for building such games: What are the core theories that can guide us, what are the critical features of EVGs, who are the members of the design teams involved, and what does an instructional designer need to know and be able to do to be a productive member of such teams?

As an instructional designer, we are skilled at analyzing a given modality for its ability to support desired strategies and outcomes. Just as we know that textbooks, video, or lecture-based instruction are not appropriate for every learning problem nor every learner, in all venues, nor at all times, neither are games. Games are effective when they align with the instructional outcomes and strategies within the constraints and affordances of the medium, the given environment, and the set of learners.

However, videogames are *not* like other modalities, and instructional designers often struggle to recognize the multiple ways in which they differ and to modify their design processes accordingly. First, videogames require interactivity to an extent and in a way that other modalities do not. To be sure, all instructional design processes require us to elicit learner performance and provide feedback *at key points* in the instruction. However, interactivity is a near-continuous feature of the videogame experience: the *sine qua non* of videogames. Designing EVGs therefore requires a comprehensive understanding of how this interactivity modifies instructional design practices. Second, videogames have a specific language with which instructional designers must be well-versed, and a unique toolset which places constraints on the design process. Understanding level design, skill trees, challenge levels, character classes and attributes, distributed point systems, and power-ups, for example, is essential. Third, videogames are not one medium, but many. Massively multiplayer online role-playing games (MMORPGs), single-player first-person shooters, and cooperative action games may share core features, but they can also differ radically. Understanding these differences is crucial when designing different EVGs for different audiences. Fourth, EVGs require a continual balancing act between learning outcomes (and their associated design practices) and play itself. Instructional design places learning at the center of the design process, where the strategies, media, and content are designed *around* the core learning outcomes and objectives. This creates an outcome-centric view of design that often leads instructional designers to “suck the fun” out of games (Prensky, 2004). This has led some in our field to suggest that instead of designing games for specific learning outcomes, perhaps we should be finding games that align with our outcomes and designing ways to use these commercial off-the-shelf (COTS) games for our goals (e.g., Charsky & Mims, 2008; Turcotte et al., 2018; Van Eck, 2008). Fifth, and finally, EVGs require diverse design teams comprising graphic artists, voice-over artists, sound designers, videographers, animators, programmers, and measurement experts. Instructional

designers typically do not understand the practices, vocabulary, or culture of these design teams, nor do the other team members necessarily understand instructional design. In our experience, learning to negotiate this landscape represents one of the most difficult challenges for the design of EVGs.

It is not possible to address all of these ideas comprehensively here, of course, and we have written about these ideas elsewhere (e.g., Hirumi et al., 2010a, 2010b, 2010c). We hope that by providing an overview of these key principles on game design, based on our collective experiences, we can help you arrive at competency faster than we did by learning it all the hard way!

EDUCATIONAL THEORY AND EVGS

When games made the leap from analog to digital in the 20th century (first as arcade machines, then computers, consoles, and now mobile devices), research on their efficacy picked up in earnest. Seminal publications like Patricia Greenfield's *Mind and Media* in 1985 (see Chapter 7) and Jim Gee's *What Video Games Have to Teach Us About Learning and Literacy* (2003) promised to usher in an era of research practice founded on sound theory and experimental design. One of the key pitfalls awaiting new scholars in games for learning, however, lies in assuming that "new" videogames can only be explained by "new" theories. All fields evolve, of course, and new theories emerge and are tested as new learning modalities emerge and as learners continue to evolve. However, this necessary evolution *builds* on rather than *negates* prior research, and most learning is effective (or not) for reasons that can be explained by the same set of core theories and precepts of instructional design.

The design of EVGs (or the use of COTS games) can be driven by many theories. Principles of behaviorism (e.g., schedules of reinforcement, stimulus-response latency, and association) help us understand how *Jeopardy*-style games work for factual information. Constructivist principles (e.g., social negotiation of meaning) help us understand how people make meaning of their experiences in open worlds and MMORPGs. Sociocultural learning theory helps explain how culture mediates and situates knowledge, and of course, many other things like motivation, locus of control, and self-efficacy help predict how people will experience and persevere (or not) in game worlds. In addition to these kinds of theories, there are four that we think are critical to the design of EVGs. The first is the theory of play itself.

We argue that a game is engaging, or fun to play, if it triggers the play phenomenon in the player. So, we must take some time to understand the play phenomenon. Fortunately, much research has been done on play from a multitude of disciplines such as education, psychology, sociology, and anthropology. Making play a co-equal objective of learning via games requires a paradigm shift for most designers – one that is very learner-centered and constructivist in nature. To understand this paradigm, you need to understand the difference between merely "playing" a game and being "at play." The former can be mandated by a teacher to students or a trainer to a group of employees, and these participants can dutifully "play the game." However, these individuals may never have been "at play," meaning that they never entered the conceptual cognitive or cultural space in which play occurs (Huizinga, 1950).

Everyone reading this chapter has probably experienced play within the last 24 hours, even though you may resist, as many adults do, using that word

to describe it. You may have experienced play while engaged in a hobby such as gardening, woodworking, photography, painting, or some craft. You may have experienced it while caring for a son or daughter and enjoying each other's company. You may have experienced it while reading a book, playing a musical instrument, or playing a videogame.

Regardless of the activity, it probably happened during your leisure time, although if you are fortunate enough to love your job, it may have happened at work. It was definitely something you *wanted* to do, and you would say that you did it voluntarily. You found the activity intrinsically motivating, so you were not concerned about "getting something" out of it. You were also doing something actively and possibly physically. Finally, you were likely in a state where you were not conscious of yourself or of your place in the world, but rather felt wholly absorbed in the activity – you were immersed in it. This state also carried a feeling of being very free from risks. You felt free to try new things or to experiment with different ways of doing or thinking – after all, it was only play. Your awareness of time likely disappeared, and you were probably surprised by how much time had passed when the activity had ended (see Pellegrini, 1995; Rieber, 1996; Sutton-Smith, 1997 for formal definitions and attributes of play).

Educators and other educational stakeholders (e.g., parents, state legislators) are often quick to ask "What good is play? Does it lead to some productive outcome or result?" The seminal work of Jean Piaget remains an important starting point for such questions (Phillips, 1981; Piaget, 1951). Piaget felt that play and imitation were core and innate human strategies for cognitive development. With play, a child could rehearse a newly formed concept to make it fit within what he or she already knew and understood (assimilation). As a child experiences new events, activities, ideas, or rituals, imitation is used to build entirely new mental models (accommodation). The child continues in this way to achieve an orderly, balanced world while constantly confronting a changing, shifting environment. Just as the mental processes of assimilation and accommodation continue throughout life, so too do play and imitation remain important cognitive tools for people from childhood through adulthood.

There are other examples of research literature, while not overtly aligning with play, that are clearly in the same camp. The research on self-regulated learning (Zimmerman, 1990, 2008) is one example, especially with its emphasis on an individual actively working toward goals within intrinsically motivating activities. However, the attributes of flow theory proposed by Csikszentmihalyi (1990) are the most similar to that of play, especially in the context of game design. For example, flow theory specifically addresses the need to optimize challenge, which not only improves learning but helps to prevent anxiety and boredom. Activities that induce flow have clear goals, coupled with clear and consistent feedback about whether a person is reaching these goals. Another important attribute of flow is that it takes effort to attain a state of flow, requiring a clear and deliberate investment of sustained attention.

The second key theory to understanding how EVGs are effective is situated cognition (e.g., Brown et al., 1989; Lave, 1988), which argues that to "know" something is to "do" something, and that "doing" is inextricably bound to the contexts in which that knowledge is relevant and demonstrated. Instructional designers, by extension, should consider designing learning *environments* that embed the intended learning outcomes. A classic example of situated

cognition that is often cited is of children in Brazil who were taught mathematics in a decontextualized manner in school (e.g., lesson and workbooks full of formulas and operations) but actually learned (and demonstrated) mathematics through selling goods on the streets (Carragher et al., 1985). School exams could not measure this knowledge because the assessment was not embedded in the learning context.

Videogames are a clear example of situated cognition; the intended learning takes place and is assessed in the context of the game. By embedding “knowing” in “doing,” situated cognition approaches may also promote transfer of learning. We often hear educators, parents, and politicians lament that students cannot solve “real-world” problems, even when they have “demonstrated” the knowledge on (decontextualized) school exams. There is evidence that EVGs designed around these principles can indeed promote transfer of learning (Van Eck & Dempsey, 2002).

One of the key concepts to designing situated cognition learning is authenticity, which refers to the extent to which actions *taken* within that designed environment reflect the actions and processes that would normally occur when *demonstrating* that knowledge in that environment. It also means that the environment *behaves* authentically, in that actions taken by the learner result in the kinds of responses by the environment (and the people, tools, and resources within it) that would happen in that environment. As you will see later in this chapter, authenticity and situated cognition are also key concepts for assessment of learning in EVGs. This is not to say that the game must be a fully realized reflection of the real world, of course. There are many aspects of the environment that do not apply to a given learning situation (e.g., one need not experience a virtual world with gravity in order to learn how to react to angry customers in customer service training), and research on simulations has suggested that irrelevant details (seductive details) actually interfere with learning (e.g., Harp & Mayer, 1997). Even *relevant* information may be problematic if the learner’s level of expertise is insufficient (e.g., Adcock et al., 2010).

While “real world” and “authentic” may sound like synonyms, there are important distinctions. Asking a student to solve a word problem about dividing up a *Pokémon* card collection is *not* a real-world example; it is a problem *about* a real-world problem. Putting kids in groups with *actual Pokémon* cards and telling them to work out a fair way to divide them so each person has the same value is probably as close to a real-world problem as we can get in schools. Having those students solve the problem by filling in worksheets or matrices based on provided values is not an *authentic* way of solving the problem; having them decide on the process to use, determine what a fair arbiter of true value is, and build their own value charts *is* as authentic as we can get. Research has shown that instruction built on these principles is effective in promoting initial and long-term learning as well as increasing the likelihood of transfer of learning to new contexts.

The third theoretical area of relevance to the design of EVGs is the research on problem solving itself. As an instructional outcome, problem solving refers to the ability to synthesize multiple rules and defined concepts and apply them to problems that do not have a known solution. It is generally believed that the only way to promote problem solving is, therefore, to present the learner with multiple problems to solve within a given domain. This is often done in the context of instructional strategies that scaffold problem

solving, sometimes called problem-centered or problem-based learning. Problem solving is an oft-cited benefit of videogames but one that is routinely oversimplified. For example, it is important to recognize that there are many different kinds of problems that vary in their cognitive composition, degree of structuredness, and required domain knowledge. Jonassen (2000) has proposed a typology of 11 different types of problems, each of which requires specific design and instructional strategies to promote. It follows that any videogames we design to teach problem solving will differ in game design and instructional strategies. This is hardly a full treatment of any of these areas, of course, but good resources are widely available for those who want to study them further. It is also not necessary to make use of every theory when designing EVGs – there are many different ways to blend these different approaches (e.g., Barrett & Johnson, 2010; Borchert et al., 2010; Van Eck, 2015).

We mentioned in the beginning that one of the biggest challenges facing instructional designers on game design teams is the delicate and complicated dance of designing for learning AND for fun. We turn our attention next to one of the biggest challenges facing designers of games in this regard: one that took decades to resolve effectively and which left a trail littered with videogames that failed to teach, engage, or both.¹ Assuming we are able to modify our design practices to balance game interactivity and fun while remaining true to the intended learning outcomes, how must our assessment design practices also be modified?

STEALTH ASSESSMENT AND EVIDENCE-CENTERED DESIGN IN EVGS

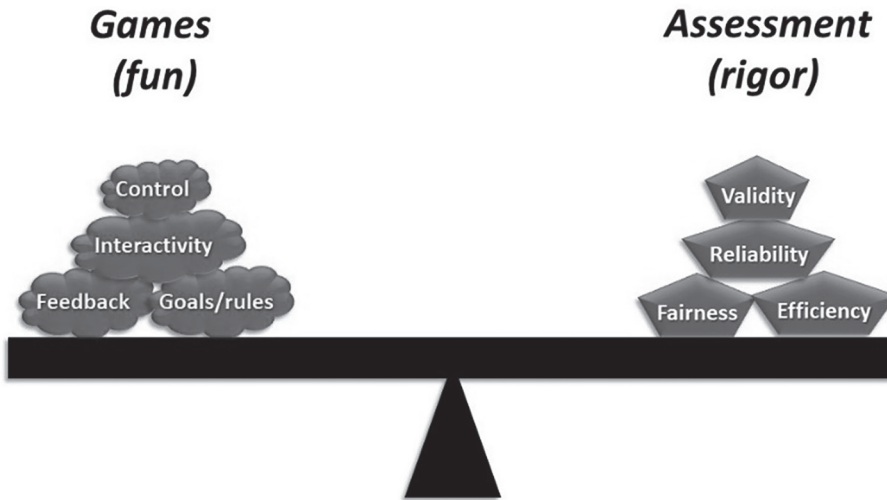
During gameplay, students naturally produce rich sequences of actions while performing complex tasks, drawing on the very competencies that we want to assess (e.g., persistence, spatial skills, understanding Newtonian laws of force and motion). A key challenge for educators who want to use or design EVGs is assessment: making valid inferences about what the student knows, believes, and can do at any point in time and at various levels during the game without disrupting the flow of the game, and by extension, the engagement and learning (see Figure 36.1).

One way to address this challenge is to use *evidence-centered design*, or ECD (Mislevy et al., 2003). ECD, first posited by Messick (1994) and later formalized by Mislevy and colleagues (e.g., Almond et al., 2015; Mislevy & Haertel, 2006; Mislevy et al., 2003) holds that the assessor must a) define the claims to be made about learners' knowledge, skills, and other attributes (the competency model); b) establish what constitutes valid evidence of a claim and how to measure that evidence (the evidence model); and c) determine the nature and form of tasks or situations that will elicit that evidence (the task model).

Stealth assessment is a specialized implementation of ECD whereby assessment is embedded so deeply into a learning environment (e.g., videogames) that it becomes invisible to the learners (Shute & Ventura, 2013; Shute et al., 2021), which promotes flow and engagement (Vygotsky, 1978, 1987). This deeply embedded, invisible assessment makes it possible to generate real-time

1 The reader is referred to the literature on “edutainment” games in the 1980s and the discussions of intrinsic and extrinsic motivation, game mechanics, and ludology of the 1990s and early 2000s.

FIGURE 36.1 Balancing fun and assessment (Shute et al., 2013)



estimates of student competency levels across a wide range of knowledge and skills, which in turn can allow for a) the delivery of timely and targeted formative feedback and/or learning supports/scaffolding (Vygotsky) and b) the presentation of a new task or quest that is at the maximal challenge for the learner's skill level, also known as the zone of proximal development (Vygotsky).

Stealth assessment is a particular type of learning analytics that is unobtrusive and focuses on assessment as well as support of learning (based on the results from ongoing assessments). Learning analytics generally reflect the collection, analysis, and interpretation of data to optimize educational experiences and outcomes (see Baker et al., 2021). Data may come from various platforms but typically involves the analysis of historical data to understand trends and inform future educational strategies. Assessment may be a part of learning analytics, but it is not the sole focus. Both learning analytics and stealth assessment employ artificial intelligence (AI) technologies (the use of advanced algorithms and machine learning models to process large datasets, identify patterns, and make predictions or decisions) to capture, accumulate, and make inferences about learning. One effective AI tool that stealth assessment often uses to accumulate evidence includes Bayesian networks (e.g., Pearl, 1988) to deal with uncertainty. For more details on the what-how-why of using Bayes nets to accumulate evidence in digital environments to make inferences about evolving competency levels, see Almond et al. (2015).

In videogames with stealth assessment, the competency model is created at the outset of the design process specifying competency-model variables (everything the designer wants to measure during assessment). The task model specifies learning tasks that are intended to provide observable evidence about the targeted (unobservable) competencies. The interaction of the competency model and task model is realized through the evidence model, which serves as the bridge between the two. The evidence model translates what the student says or does and expresses that information in a psychometric model showing how that evidence relates to the competency-model variables. Because this

happens in real time, the competency model is frequently updated during gameplay, resulting in probability distributions for competency-model variables for a particular learner. These probability distributions can then be used by the stealth assessment engine (see Rahimi et al., 2023) to a) generate tasks that are pitched at optimal challenge levels, b) provide some learning or affective support as warranted, c) post a current summary of competency level estimates on the game dashboard (e.g., Rahimi & Shute, 2021), and so on. More complete descriptions of stealth assessment in two different EVGs are detailed in Shute and Wang (2016).

In addition to the benefits already described, we advocate the use of stealth assessment in EVGs for several other reasons. First, it is designed to be unobtrusive and therefore frees learners from test anxiety commonly associated with traditional tests, which in turn improves the reliability and validity of assessment. Second, because stealth assessment is designed using ECD-based models, the evidence model comprises data that are far more granular (and thus more specific and useful) regarding the target competencies than is possible with conventional types of assessment. Third, because scoring in stealth assessment is automated, teachers do not need to spend so much time calculating scores and grades, thus freeing them up to individualize feedback and learning in other ways. Finally, stealth assessment competency models, once developed and validated, can be reused in other learning or gaming environments with only minor tweaks (e.g., see Sun et al., 2019). Current findings across numerous stealth assessment research reports suggest that stealth assessment a) is a theoretically grounded and psychometrically sound method to assess, support, and investigate learning in technology-rich environments (see Rahimi & Shute, 2023) and b) significantly improves learning (and not at the expense of enjoyment), regardless of gender or ethnicity (see Shute et al., 2020).

In summary, ECD provides the conceptual underpinnings for assessment via various models (e.g., competency, evidence) which are used by the stealth assessment engine to assess and support learning. Moreover, stealth assessment uses both AI technologies (to accumulate evidence and make inferences) and learning analytics (to automatically score in-game actions). Stealth assessment further embeds these ongoing, formative assessments directly into the digital learning environment (e.g., a well-designed game), blurring the distinction between learning and assessment. By interacting with an EVG, students continually produce rich sequences of actions, which are captured as data points in log files. The captured data are automatically scored by in-game rubrics (i.e., the evidence identification part of the evidence model) and aggregated in real time by Bayesian networks (or other statistical models), which show evolving mastery levels on targeted competencies. Stealth assessment is intended to help teachers facilitate learning, in a fun and engaging manner, of educationally valuable skills – many of which are not currently supported in school (e.g., creativity, persistence). By providing integrated and automated assessment tools, teachers are more likely to use the game. Shute et al. (2021) provide detailed information about the specific steps needed to develop a stealth assessment.

A simplified example from our own experience may help to illustrate how stealth assessment plays out in the real-world design of EVGs. In a game called *Rusty vs. Radon* (2018), the goal was to address radon (a carcinogenic,

colorless, odorless gas found in many homes) education, specifically the need for and process by which homeowners test and remediate their homes for radon. We hypothesized that a game in which middle school students learn about radon, paired with free radon test kits, would result in change agency efforts by the children to get their parents to test for radon in the home (something that is rarely done). We generated radon education objectives and selected those best suited to game play, reserving the rest for more formal education. In the game, students play Rusty, a junkyard robot who performs home inspections with his companion Oz, a cute cartoon worm. Oz can perform instant inspections of plumbing and wiring in homes from the inside, but he is 1,000 times more sensitive to radon than humans are, so any exposure to radon levels can make him sick or kill him. Therefore, Rusty has to do the radon testing *first* to determine whether it is safe for Oz to enter the home to complete the inspection. The manner in which he does so (i.e., the observable in-game behaviors feeding the evidence model) must reflect the best practices associated with radon testing and thus the learning principles that underly that process (the competency model).

We developed a stealth assessment approach based on ECD principles. Our game focused on understanding radon, characterized by four principles: radon is invisible, radon is heavier than air, radon can be very dangerous, and radon can be high (or low) in one home and low (or high) in the neighboring home. We used these principles to specify our competency model: always test a house for radon (radon is invisible), always test the basement first (because radon is heavier than air), do not test the first floor if the basement is low (radon is heavier than air), do not expose people to high radon or to homes where the radon is unknown (radon is dangerous), and always test every home (radon can vary from house to house). Our evidence model comprised whether radon testing occurred, which floors were tested, what order each floor was tested, whether Oz was invited into the house, and whether every home was tested. Table 36.1 presents the optimal and suboptimal sequences that represent various levels of competency.

TABLE 36.1 Simplified Stealth Assessment Table for Radon Testing for a Home With High (Basement) and Low Radon (1st Floor)

Seq.	Floor Tested 1st	Floor Tested 2nd	Thinking Bonus	Not Tested	Oz to Basement (B)?	Oz to 1st Floor?
1	1	B	-1	-	Yes (-5) No (+5)	Yes (-5) No (+5)
2	1	-	-3	B	Yes (-5) No (0)	Yes (-5) No (+5)
3	B	1	+10	-	Yes (-5) No (+5)	Yes (-5) No (+5)
4	B	-	-5	1	Yes (-5) No (+5)	Yes (-5) No (-5)
5	-	-	-7	B 1	Yes (-10) No (0)	Yes (-10) No (-10)

SUMMARY AND CONCLUSION

Our goal for this chapter was to help you identify the theories and tools you will need and the challenges you will face as part of an educational game design team. We described how play theory, situated cognition and learning, authentic learning, and the literature on problem solving are necessary for instructional designers who want to develop EVGs. We then described how ECD and stealth assessment are critical tools in this endeavor – we encourage you to pursue the additional readings and resources on these topics that we have provided in this chapter. We also alluded to the uniqueness of videogames as a modality and of the culture and language of the gaming community, which leads us to our final advice to you. If you are not yourself a game player, begin playing videogames to become conversant in their language, culture, and features. Start with AAA² console (e.g., Sony PlayStation, Xbox Series X) and computer games. You can begin with precursors to today’s modern blockbusters (e.g., *Halo*, *Gears of War*, *Call of Duty*, the Tom Clancy series, and *Left for Dead*). Play videogames both as a single player as well as cooperatively to understand how different the experiences can be. Explore MMORPGs like *World of Warcraft*. Then, move forward in time to modern-day videogames to see how the technology and game features continue to evolve. Videogames like those in the *Divinity*, *Sacred*, and *Elder Scrolls* series are good intermediary videogames to play before moving on to modern classics such as *Elden Ring* and the *Dark Souls* series of videogames. You will need a lot of help, so find experienced players who are willing to help guide you. Take advantage of all the “cheats” and “walkthroughs” and online help you can find. In doing so, you will learn a lot about the social culture, the nature of help and support in videogames (just-in-time, just-for-me, just enough). Pay close attention to the game features like skill trees, which allow you to “invest” game points earned to unlock additional powers and to build a character with specialized powers that reflect your personal style of game play. Learn how videogames allow players to set difficulty levels and how videogames become progressively more challenging (the task model) as player expertise (the competency model) increases. Understand the dynamics of character classes (e.g., magician, barbarian, archer), attributes (e.g., wisdom, intelligence, strength, dexterity), and equipment (e.g., armor, weapons) as well as how the choices you make as a player result in wildly divergent approaches to game play. Finally, learn how economies (e.g., gold, merchants) and reward systems influence behavior and play style during videogames. All of these features have analogs in educational game design if carefully and creatively considered.

Once you have a handle on the core features that are common to most AAA games, we also encourage you to explore other innovative, creative, and unusual games. Games like *The Last of Us*, *Fallout*, and *Hard Rain* are critically acclaimed AAA games that defy convention and tell complex, emotional stories. EVGs like *That Dragon*, *Cancer*, and *Bruckel* use compelling, true stories to create powerful and engaging games about love, grief, family, and history. These kinds of videogames suggest new and innovative game features that have relevance to the design of EVGs.

2 AAA (“triple-a”) refers to videogames that are produced by major game publishers who have large budgets and are thus able to develop and market complex, high-quality games. AAA games generally have higher popularity, sales, and distributions as a result.

Well-designed EVGs are a potentially powerful vehicle to support learning, particularly in relation to new competencies not currently embraced by our educational system but needed to succeed in the 21st century. Making effective use of games as a learning modality requires us to understand the nature of play and interactivity, the primary theoretical models that are compatible with videogames, the nature of game play from the player perspective, and the implications for changed design and assessment practices in EVGs. Mastering this knowledge means we are better prepared to navigate the challenges of collaborating with others in the design of good EVGs that are both fun to play AND effective learning modalities. We wish you success in your education videogame design experiences, of course, but remember to play and have fun along the way!

Summary of Key Principles

1. Good games trigger the play phenomenon in the players.
2. Videogames make extensive use of interactivity, which requires instructional designers to have both a personal and professional understanding of videogames.
3. The design of games requires instructional designers to work with multidisciplinary teams with different values, vocabularies, cultures, goals, and design practices.
4. Despite the continual evolution of game technology, core theoretical frameworks remain critical to the design of learning games.
5. There are many kinds of games, each with their own features and characteristics which must be aligned with principles of instructional design in order to take best advantage of the modality.
6. Assessment of learning in games requires a fundamental shift in our thinking about assessment, from responses to external “test questions” to embedded actions and patterns within games.
7. Good games for learning can use the information from ongoing stealth assessments to provide timely and targeted feedback to players and present new game tasks that suit the student’s current skill level.
8. Good games for learning, like all good learning activities, should be active, goal-oriented (with goals valued by the players), contextualized, and designed with adaptive challenge and support.

Application Questions

1. Design a non-digital game with everyday objects found in your home, workplace, or classroom (e.g., paper cups, paper clips, ping pong balls, etc.). Ask friends, students, or co-workers to play it, then ask them if they think the game is any fun. Ask them for ideas to improve the game. Using any of their ideas, and others you thought of, redesign the game and ask another group of friends to play this new version. Is the game more fun? Try to list or chart out the design process you experienced. Does the game have any value for learning? If not, what is missing?
2. Choose a learning theory that you feel is compatible with games. What kind of videogame do you think it would be most compatible with? Why? What are the design

- implications of adopting that theory for a given game? Name one example of a specific design element in a game that is compatible with your theory.
3. Identify an instructional outcome at the level of problem solving and try to come up with a narrative description of a game that could promote that outcome. How would you make it situated? Authentic? Where would it take place, who would be involved, and what would it look and feel like?
 4. Using the game idea from the previous question or for another game idea/outcome of your choice, describe an approach to stealth assessment that could be built into that game. Be specific in addressing how it aligns with your learning outcome, how you would measure it, how you could integrate it surreptitiously, and how it could be used for assessment, to modify game performance in some way, or both.
 5. If you have not played any/many AAA console games, find a friend or family member who does and ask them to help you get started with a game. Keep a diary of your experiences, describing things like:
 - What is the player experience like?
 - Do you find yourself frustrated while you are learning?
 - How do the features of the game help drive engagement?
 - Which do you see aligning with established instructional design principles and practices?
 - What are the implications for how you approach the design process (i.e., what has to change in your current practice in order to be successful)?

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SECTION **IX**

Current Issues in
the IDT Field



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Professional Ethics

Design Practices for an Embedded Approach

Stephanie Moore and Heather Tillberg-Webb

FROM CODES TO PRACTICE

Although ethics received very little attention in instructional design and technology (IDT) scholarship for much of its history as a field (Moore, 2021; Moore & Ellsworth, 2014), there has been a recent boom of activity and attention. Concerns about data rights, privacy, dignity, security, and integrity prompted by learning analytics, student proctoring and surveillance technologies, and artificial intelligence in particular have driven increased attention to ethical issues (Prinsloo & Slade, 2013; Pardo & Siemens, 2014; Ifenthaler & Tracey, 2016; Jones, 2019; Kimmons & Veletsianos, 2021; Blackmon & Moore, 2020; Lachheb et al., 2023).

In addition, the COVID-19 pandemic also appears to have catalyzed attention to socio-ethical issues in IDT. Although inequalities in the form of digital divides existed prior to the pandemic, the mass shift to emergency remote teaching (Hodges et al., 2020) using online learning platforms and tools highlighted and often exacerbated digital access inequalities across income, racial dimensions, and other access considerations (Custodio, 2020; Gould & Shierholz, 2020; Vogels et al., 2020).

In 2023, the first book focused exclusively on ethics and educational technology was published (Moore & Tillberg-Web, 2023). In that book, we advanced a framework for ethics that centered around three key ideas: reflection, interrogation, and design. That framework takes a socio-technical approach to educational technology, recognizing that technologies are influenced by social, cultural, and other values, and that technologies are developed and applied in social, cultural, and political contexts which influence decisions on design, selection, implementation, and evaluation. Instead of codes, it focuses on how designers engage in different types of reflection, such as reflection-in-action and reflection-after-action (Schön, 1983; Tracey & Baaki, 2014). It also centers

the idea of “ethics as design” from Whitbeck, a pivotal scholar around the connections between design and ethics, as a means by which practitioners can pragmatically translate critiques into a course of action.

HOW DO PROFESSIONAL ETHICS FIT WITHIN EVERYDAY DESIGN PRACTICE?

Often, the first thoughts to come to mind on ethics may be ethical codes of conduct or philosophical approaches to ethics (e.g., deontological, utilitarianism). However, research on codes of ethics routinely demonstrates their failure to translate into practice (Boatright, 2013; McNamara et al., 2018), even when codes of ethics are presented to study participants right before they work on a project. Guersenzvaig (2021) explained that a reason for this is that codes reflect a normative approach to ethics and thus can fail to account for multiple perspectives and contextual factors that influence the application of ethics in practice. He argued that professional ethics are “a larger endeavor” than codes and are “open to substantiated disagreements emanating from the multiple perspectives that may participate in the discipline” (2021, p. 51). While codes play an important role in establishing professional expectations and standards that enable accountability, they are insufficient for providing practitioners guidance on just how to apply them in practice because they are often vague and non-specific to contexts or situations. Practitioners must be able to identify ethical issues in practice and generate responses and solutions.

That “larger endeavor” can be seen in recent trends in professional ethics – especially in technology- and design-oriented disciplines – that focus not on codes, philosophy, or individual moral development but instead on the applied and practical nature of ethics as embedded in professional practice. For example, the IEEE publication *Ethically Aligned Design* was co-written by the engineering community of researchers and developers to integrate ethics into the design, development, and research of autonomous and intelligent systems (2019). Their collective work does not focus on or advance a code of ethics but instead articulates a vision for how the well-being of humans can be supported by autonomous and intelligent systems and identifies the ethical and social dimensions of such systems – such as personal data rights, individual control, and well-being – as parameters and constraints that shape the development of such systems. Similarly, the work of Gray and Chivukula (2019) has underscored the situated nature of ethics in technology and design context, including the need for practitioners to be aware of how their own applied ethics knowledge, individual practices, and organizational practices mediate a designer’s ethically focused awareness and action.

Whitbeck (1996) argued that ethics are too often confined to the role of judgment or evaluation when in fact ethics require synthesis. She explained that both ethical problems and design problems are very similar: for both, there is rarely one unique or perfect solution, and instead there are a range of possible solutions. Those possible solutions balance trade-offs differently, and individual designers will vary in how they balance and frame these issues, thus deriving different solutions (Svihla, 2020). In this way, we can reframe ethics as a form of design where synthesis is essential in addressing broader social problems and ethical issues in practice (Whitbeck, 1996) and as a form of reflective practice where interrogation and analysis inform solutions that

professionals creatively devise (Moore & Tillberg-Webb, 2023; Lachheb et al., 2023; Moore et al., 2024), whereby designers do “ethics by other means” (Verbeek, 2006). Rather than “the judge’s perspective” where blame is assigned for failures and solutions are characterized in absolutist terms of “right” or “wrong,” ethics reframed through the lens of design focuses instead on how practitioners creatively devise solutions to complex learning problems that include ethical and moral dimensions and to complex moral and ethical problems that include learning dimensions (Whitbeck, 1996). Additionally, ethical awareness and action is shaped by the organizational and professional context across the project life cycle (Chivukula et al., 2020), requiring a range of different supports. In other words, to incorporate ethics into practice, you can envision how various considerations map into decision making at any stage in the design process and are influenced by contexts of practice.

HOW CAN DESIGNERS EMBED ETHICS IN PRACTICE?

The framework of reflection, design, and interrogation of technology (Moore & Tillberg-Webb, 2023) can be a helpful way to organize different design practices that can be used to embed ethics or adapted to incorporate ethical considerations. For this chapter, we’re focusing primarily on the natural ways ethics fit into the design process and designers’ practices, especially aided by the tool of reflective practice. Because most contemporary instructional design solutions embed technology, interrogation of technology often takes the form of asking critical questions, and in this chapter we have embedded critical approaches to technology in design practices where critiques are translated into specifications and parameters for design and decision making.

Ethics as Reflective Practice

Shanks-Kaurin (2018), a moral philosopher, defines ethics as a process of “reflection, critical questioning, justification, argumentation, and application” (para. 4) on morals, beliefs, and values both individually and in context of situations. This distinction of ethics as a process of reflection rather than sets of morals, beliefs, or values invokes the idea of the “reflective practitioner” (Schön, 1983) in which practitioners continuously incorporate lessons learned to improve outcomes and processes.

Ethics as reflection can take on two forms: reflecting on one’s own ethical perspective(s) and reflecting on ethical dimensions of the problem space throughout and after a design project as reflection-in-action and reflection-after-action. First, it is important to recognize that professionals can and do draw upon differing ethical perspectives – such as care ethics, which focuses on the importance of sympathy, empathy, and compassion in guiding ethics; duty- or rights-based ethics, which emphasizes human and civil rights as critical to ethics; virtue ethics, which emphasizes the moral character of an individual such as caring, courage, and honesty; principle-based ethics, which focuses on following moral rules or applying specific principles such as dignity and inclusion; or ethics that focus on consequences. You are not only an instructional designer or technologist but also a human being who brings values, beliefs, expectations, motivation, curiosity, doubts, and a range of other human characteristics that are necessary to identify and critique through

reflection. You may do this individually as well as with your core design team and any additional stakeholders in the process. Often, individuals draw from multiple perspectives and may even be influenced by the nature of a design project, context, team, etc. to draw on different perspectives across their body of work.

One way to translate professional ethics into practice is to pause and reflect on your perspective and begin to articulate for yourself what approaches resonate with you and why. This can help designers become more purposeful and thoughtful about the values, beliefs, and morals they bring to design work. The Northwest Association of Biomedical Research created an excellent ethics primer that includes a summary of different ethical perspectives with one-page summaries along with challenges or limitations of each and a comparison chart – pages 18–23 may be particularly useful (Chowning & Fraser, 2007).

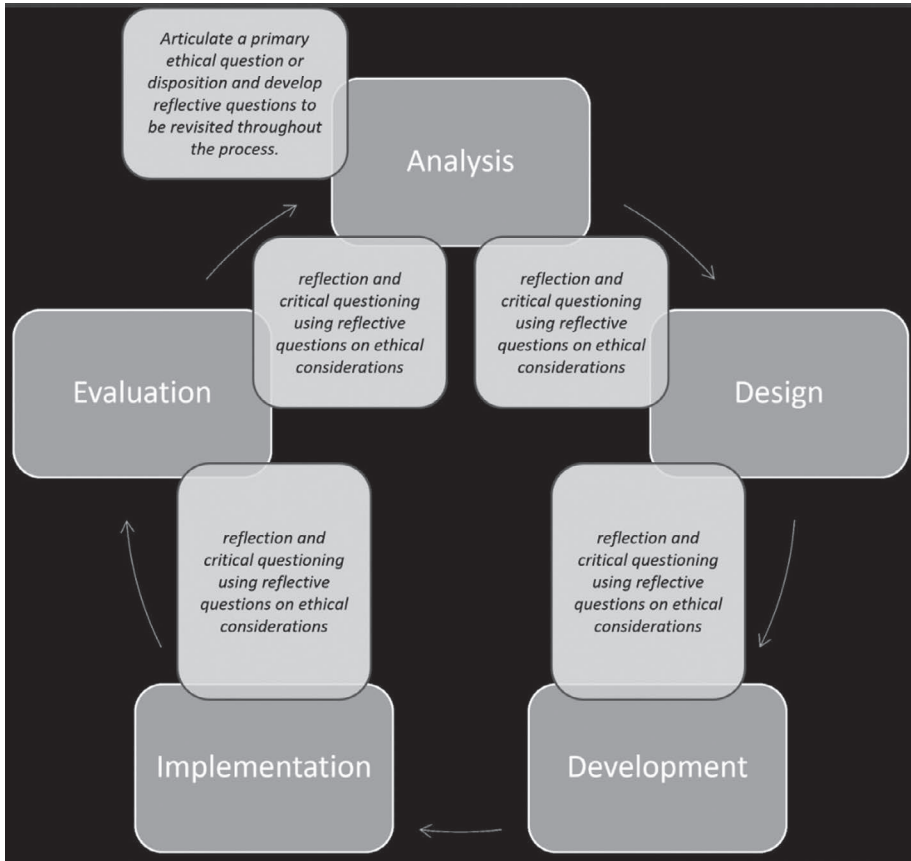
In addition to being a form of individual or personal reflection, ethics can become a reflective loop integrated into the design process, or what Schön (1983) described as double-loop learning whereby designers reframe both the problem they are working and their mindset during the design process. Moore and Griffin (2021) described how professional ethics can become a form of reflection-in-action where designers ask particular types of questions and reflect on their decisions during different design phases and tasks. A really good example of this was illustrated by Ingraham and Boyd (2020) as they discussed their work designing and developing virtual worlds and simulations. Adopting a critical approach, they posed a guiding question for their design work: how could they support social justice for learners? Breaking this down into a more practical and manageable design task, they identified three specific ethical concerns in virtual world and simulation design centered around principles of justice, equity, and diversity: whitewashing/normalizing whiteness, racial stereotyping, and digital blackface. To meaningfully embed these concerns into practice, they developed three questions that they asked themselves throughout the process: does this design include people of color, do those characters reflect any racial stereotypes, and who is performing that character?

Exploring this one example, we can see several key practices this design team employed to embed ethics as reflection: they articulated a central question (on social justice) that they wanted to reflect on throughout their design process; they framed the problem they were working on not simply as a learning or technical problem but also identified the human and social aspects of the problem; they selected three specific ethical concerns they wanted to address; and they developed explicit questions that they used to reflect on and question their products and processes. Figure 37.1 uses the basic components of design – analysis, design, development, implementation, and evaluation – to demonstrate how ethics can be incorporated in any stage of the design process as reflection-in-action.

Embedding Ethics in Design Practices and Processes

Ethics problems and design problems have many features in common. In addition, ethical and moral dimensions exist in the instructional design problems we work on, and those problems cannot be ignored. McDonough (2006), an architect and sustainability designer, argued that unintentional and unjust impacts and outcomes of designs are “no longer acceptable for us to say this

FIGURE 37.1 Ethics as reflection-in-action throughout the design stages



isn't part of our plan . . . because it's part of our *de facto* plan. It's the thing that's happening because we have no other plan." He described design as "the first signal of human intention" and asked designers to reflect on what their designs reflect about what they intend and what their vision is for humans and society. Design may often be defined as an inherently optimistic endeavor. Consider the following definitions of design throughout the years:

- Design is a purposeful activity directed toward the goal of fulfilling human needs (M. Asimow, 1962).
- Design reflects an imaginative jump from present facts to future possibilities (Page, 1966).
- The designer devises a plan for achieving a purpose or goal they have envisioned (Rittel & Webber, 1973).
- Design is oriented toward how things ought to be, as a designer devises a course of action to change existing situations into desired ones (Simon, 1969, 1988).
- The main activity of design is realizing a need then translating a vision of the future system into reality to address that need (Mathur, 1978).
- Design is a way of addressing human conflicts and devising a desirable human future (Weisbord, 1992; Kozma, 2023).

Although instructional design processes and models have been sanitized of any presence of the designer and the influence of their perspectives and values (Smith & Boling, 2009), designers and their values very much shape and inform how problems are framed and thus what solutions are developed. Gray and Boling (2016) identified multiple ways in which designers integrate values and ethics into design activities and artifacts. They observed that “the constraints that the designers and their teams selected dramatically impacted the scope of potential outcomes of the design process” (2016, p. 989). Designers used tools such as problem framing and identifying and prioritizing design constraints and specifications as key strategies for integrating ethics into the design process, especially during the front-end analysis phase of planning. Additionally, designers articulated individual design philosophies or worked with the design team to articulate a joint design philosophy that guided their projects. Designers also used processes for stakeholder input and buy-in to reveal assumptions and navigate differing values and priorities as well as a way to facilitate shared agency in the design process. Gray et al. (2023) have developed additional resources supporting ethical awareness in design, including strategies for aligning team values, “breaking your design” to identify flaws, better understanding one’s responsibility as a designer, and choosing and integrating methods in your work practices.

Articulating a Design Philosophy That Includes Ethical Commitments

As you consider how to actively incorporate ethics into your processes and designed solutions, one place to start is an articulation of your own design philosophy or approach that includes what values or principles are important and what commitments or priorities are important to you. This can also be a shared or collaborative process working with a design team and stakeholders, and that shared process can also illuminate places where values or priorities may conflict.

One excellent example of ethics in a design philosophy is accessibility and universal design for learning (UDL). Universal design (UD) emerged as a result of intentional efforts across different disciplines to develop design standards for making physical infrastructure more accessible to as many users as possible (Connell et al., 1997; Mace et al., 1985; Moore, 2007; Ostroff, 2011). This gave rise to the design philosophy of “barrier-free design” in architecture and environmental engineering in the 1950s, which centered the removal of obstacles for people with physical disabilities as a core tenet in engineering and architectural design. That philosophy expanded into product design, communications, and environmental design, with additional design philosophies such as “design-for-all” and “lifespan design,” then eventually the term “universal design” coined by Mace in 1987.

Like industrial design, architecture, environmental engineering, and other design disciplines, instructional designers can and do articulate design philosophies that include principles, values, and societal commitments that are important to them. Gray and Boling (2016) observed some designers emphasize agency of the learner; others explicitly articulate a personal design.

Framing Design Problems to Include Ethical Considerations

Svihla's (2020) work on problem framing in design highlights how designers solve the problems that they *frame*. She defines problem framing as a process by which a designer takes ownership of a problem and iteratively defines what the problem really is, including decisions on what should be included and excluded and how to proceed in solving it. Designers frame problems differently because they bring different questions, experiences, and perspectives into the design process. As a result, designers ultimately produce different solutions even for what seems like the same problem because different framing means they are actually solving different problems. This invokes a sense of professional responsibility that designers have, as problem framing recognizes the presence of the designer in shaping problems and solutions, not merely as a facilitator in a neutral position.

Problem framing can be used more consciously and intentionally as a design tool to frame ethical considerations into problem definitions and solutions. Designers can address ethical considerations in their designs through problem framing that intentionally incorporates such considerations. For example, an instructional designer working in higher education may be asked by their director or dean to support faculty on the use and integration of AI technologies into their teaching. The designer may choose to frame the problem in more technical terms, focusing on teaching faculty about the array of tools and how to use them. The designer may frame the problem in more pedagogical terms, focusing on strategies for instruction and assessment and how AI tools might be used to support those. The designer could frame the problem as both technical and pedagogical, covering tools and instructional strategies. The designer could also further frame the problem to include ethical considerations and incorporate those alongside the technical and pedagogical. Each of these differing approaches would lead to different designs for faculty support and development. Overt activities such as writing a problem statement for a design activity or facilitating a meeting with a team to discuss the design priorities and frame the problem can support the intentional and transparent integration of ethical considerations into the problem definition.

Adding Ethical Analysis to Front-End Analysis

Moore et al. (2024) suggest that ethical analysis is an additional form of analysis that can be incorporated into the front-end analysis phase of instructional design. They define ethical analysis as a process of identifying both potential harms and potential benefits that then comprise parameters or constraints that inform design and decision-making processes. One straightforward approach to this is incorporating an ethical analysis alongside a contextual analysis and gap analysis early in the design process. Ethical analysis could take the form of a table with two columns – one with potential benefits and the other with potential harms or risks – followed by an overarching question of “How will I steer the solution to maximize the intended benefits while minimizing the potential risks?” Table 37.1 is an example of one such analysis mapping out potential benefits and harms of AI in education.

TABLE 37.1 Subset of Potential Benefits and Harms of AI in Education
Adapted from Moore et al. (2024).

AI – Potential Benefits	AI – Potential Harms	Related Ethical and Legal Principles
• Provide support to certain aspects of student learning 24/7 • Supporting educators in repetitive tasks, which saves them time that can be spent on more meaningful interactions with students • Scaffold students in their work on complex tasks	• Exploitation of workers and environment in under-developed and developing countries • Unwanted/unplanned loss of opportunity to develop students in certain aspects • Possibility of distrust in educators due to potential failures of AI machines in the decisions and tasks educators delegate to them • Unfair treatment of students from different backgrounds based on biased or limited data used to train the algorithms that might not be a good reflection of the population of students	• Power • Consent • Control and agency • Privacy, safety, and security • Copyright • Bias and wrongful discrimination • Academic integrity • Trust

Ethical analysis can also help situate critical approaches to technology in the work of instructional design, as interrogations and critiques of technologies give shape to design specifications and parameters. Rather than treating benefits and harms in absolutist terms where potential harms dictate outright rejection of the technology or potential benefits dictate blind adoption of a technology, Scholes (2016) demonstrated how potential harms and benefits can be treated as design parameters and constraints. She articulated a central question that helped to frame the design problem and therefore the possible range of solutions, asking, “how can we capture this valuing of individual agency whilst employing learning analytics?” (2016, p. 951). By expanding the problem framing of learning analytics, to include learner agency, the analysis of risks and benefits portrayed a more holistic analysis of the risks and benefits to learners. From this example, we can see how designers as professionals play an important role in devising solutions that maximize benefits and minimize harms by emphasizing individual learner choices and efforts. For example, if a specific variable seems to predict student success in online learning, an instructional designer can devise an instructional intervention or support tool to create conditions of success for individual students. Designers can also question what variables are dynamic, not static, and therefore changeable through an intervention and then devise an intervention. In this sense, “design is an ethical act” (Gray, 2023) where professional tools of the trade are the means by which instructional designers shape technologies in desired directions and change current situations into preferred ones.

For practitioners in leadership positions, analysis of potential benefits and harms can also be folded into other organizational processes like technology

evaluation and procurement. For example, a university may integrate accessibility, data rights, privacy, and affordability parameters into the formal technology procurement process, thus leveraging procurement policies to better bound technology decisions to include ethical considerations. Educators and instructors can similarly incorporate ethical considerations into their selection of technologies for use in the classroom. Warren and Beck (2023) developed a technology decision-making framework with teachers to support them in asking important questions about technologies as they choose them and use them. Along with considerations such as usability, learning benefits, and alignment with instructional needs or objectives, their framework – Ethical Choices with Educational Technology (ECET) – incorporates ethical considerations both as a separate dimension and as they intersect with other considerations. They have evolved their framework through collaboration with teachers into a model with user-friendly questions that can support teachers in their ability to analyze potential benefits and harms as part of the technology evaluation and selection process.

Involving Stakeholders to Create Shared Agency in Design

Nearly every study or framework for change emphasizes the importance of eliciting input from the people in the system who will be impacted by the changes (Zaltman & Duncan, 1977; Havelock & Zlotolow, 1995; Ely, 1990). For example, Hall and Hord's (2001) Concerns-Based Adoption Model (CBAM) includes the affective aspect of change and recommends that designers seek to understand individual attitudes and concerns about how a change will impact their work or lives. In change and technology integration research, stakeholder involvement, or lack thereof, repeatedly plays a crucial role in the effectiveness and success of a design or implementation. Change is a dialogic process, which is why communication theory is central to many theories and models of change (Ellsworth, 2000; Faber, 1998; Rogers, 2003). Facilitating change means bringing voices into communication; ignoring stakeholders or particular stakeholder groups can become a form of marginalization that shifts certain voices, values, and interests to the center of the design solution and others to the periphery. In urging an approach grounded in systems theory, Banathy (1994) argued:

Participation in design of all those who will inhabit the system, and who will be served and affected by it, is a cardinal design principle. Such participation makes possible informed contribution to the creation of the system and the incorporation of individual and collective values and aspirations into the design. Participation ensures that people will have genuine commitment to the emerging design and to its implementation. Participation empowers, and design is empowered by it.

(p. 32)

Participatory design is one design framework that centers stakeholder engagement, aimed at addressing issues of power dynamics between learners or users and designers to create solutions that actually meet stakeholder needs (Könings et al., 2005, 2011, 2014; Bang & Voussoughi, 2016). Participatory design espouses the value that “students should help shape rather than

TABLE 37.2 Practices for Embedded Ethics

Design Philosophies	Problem Framing	Ethical Analysis	Stakeholder Involvement	Reflection-in-Action
Articulate an individual or shared design philosophy that includes statements of values, priorities, and commitments	Draft a problem statement for a current design effort and revise it – individually or in a group – to frame ethical considerations into the problem; devise a central question	Identify both potential benefits and potential harms; create a table or chart that can then be used to inform possible solutions or approaches	Facilitate stakeholder input throughout the entirety of a design project; participatory design can be a useful design framework to center learners and other stakeholders	Develop a set of specific questions you can use to reflect on priority ethical considerations throughout all phases of design

simply be shaped by educational policies and practices” (Cook-Sather, 2003, p. 22). It highlights the difference between doing things *to* learners or users versus creating and designing *with* learners and users. Rooted more in political and critical theories, such as feminism, participatory design emphasizes empowering users in and through the design process to make them active participants in designing their own environments and mediating artifacts.

Participatory design shares agency in design with other stakeholders, including them in how the problem is framed and addressed. In educational design, the challenge of stakeholder involvement is even more complicated as interests of parents, employers, and other societal expectations influence the design process and outcomes. One example of a participatory design approach is summarized in Beabout’s (2014) work on re-creating schools in post-Hurricane Katrina New Orleans. Beabout advocated for community engagement and participatory design alongside theories of educational change and leadership, arguing, “conceptions of social justice in an unjust world are of limited use unless they are explicitly connected to theories of organizational and social change” and that the inverse should also be true, that “our conceptions of change must be tied to social justice” (p. 543).

An Ethics-in-Design Toolkit

In addition to reflection-in-action, pragmatic tools that designers can use to embed ethics into practice include design philosophies, problem framing, ethical analysis, and stakeholder involvement. Table 37.2 summarizes this suite of practices for ethics in instructional design and educational technology decision making.

CONCLUSION: THE IMPORTANCE OF ETHICS IN DESIGN PRACTICE

We are increasingly recognizing that the problems we are working on as professionals are complex and have impacts and implications that include

learning but are not limited to learning. These impacts can often include exclusion and marginalization, diminishment of individuals' rights and agency, compromised privacy or security, perpetuation of bias or discrimination, and even environmental impacts through energy consumption and dangerous chemicals in landfills because of discarded hardware. While codes of conduct may be helpful for professional behaviors such as accepting bribes or violating copyright, professional ethics are not limited to such situations. Ethical issues rarely have a clear right answer or choice and instead require creative problem solving and synthesis of various considerations into a range of possible solutions. Ethics is also a means by which professionals engage in reflective and contemplative practice. Diverse perspectives among professionals means that individual designers can arrive at different conclusions and frame problems differently without being categorized into binaries of "ethical" or "unethical." Rather than being evaluative or a form of judgment, ethics describe dimensions of problems IDT professionals work on. In contrast to a code-and-compliance approach, ethics as design and reflective practice is a way to rethink both professional ethics and professional practices.

Summary of Key Principles

1. **Ethics are a form of reflective practice.** Rather than thinking about ethics as a set of philosophies one must study or codes to which one must adhere, a more useful approach – especially for a design- and technology-oriented discipline – is to think of ethics as a *process* for reflection, questioning, and application. Ethics as reflective practice invokes the idea of the reflective practitioner (Schön, 1983), and reflection-in-action is a particularly useful tool for designers to embed ethics into practice.
2. **Ethical problems are similar to design problems and are embedded features of instructional design and technology work.** There is rarely one unique solution, and often designers or leaders must devise – or design – solutions where ethics are incorporated as design parameters or constraints. This requires balancing trade-offs and generating a variety of solutions that are responsive to multiple perspectives. Designers also bring their individual perspectives, beliefs, and values to the design process, and their solutions are influenced by these perspectives.
3. **Ethics are often navigated by teams in organizations, not just individuals, where important differences arise.** Although much of ethics has focused on the individual, ethical issues are addressed in work that most often involves working with others. This introduces differing ethical perspectives, values, norms, and priorities or needs that must be navigated throughout the design process of a project. Professionals can reasonably disagree, and these disagreements may present design tensions.
4. **Problem framing can intentionally illuminate the ethical dimensions of the problems IDT professionals work on.** Svihla (2020) defines problem framing as the process by which designers take ownership of a problem. A process of problem framing can be used to incorporate ethical considerations alongside technical and pedagogical aspects.

5. **Ethical analysis can and should inform the development of solutions and options.** While critical theory may be a useful tool for analysis, it requires a companion theory of action. Incorporating ethical analysis into the front-end analysis process is one way to embed critical

questioning into design and development. This situates ethics as a tool to inform design and development as ethical considerations become additional constraints or parameters that inform possible solutions.

Application Questions

1. You've been hired as a consultant by your state department of education to work with adult education programs on the integration of technologies into their programs and curricula. During your first meeting with program directors, you hear a lot of concerns and discomfort with technology being expressed related to economic and educational barriers. You quickly realize that the problem you've been asked to work on is about more than just the use of technology for learning. You also realize that no adult learners are sitting at that table. How would you engage your ethical problem framing, stakeholder involvement, and your positionality prior to engaging in design?
2. During a grade-level meeting, several teachers start to brainstorm ideas for integrating free and open online resources such as videos and simulations into their classes. The social studies teacher is particularly interested in using some videos and resources on various historical

events created by different museums and other non-profits. The math teacher wants to integrate in some examples of jobs in math so students can see practical application and career opportunities. The science teacher would like to add some virtual labs to class as ways to expand students' opportunities to apply the principles they're learning. All of these ideas have good pedagogical rationale, and it's nice to see everyone energized about using open resources. As the school's technology coordinator, you really want to support their creative ideas for their classes. What ethical considerations will you raise with the group? Generate a list of both potential benefits and potential harms or risks, along with any related principles. How can you work with this group of teachers to incorporate these considerations in such a way that you don't throw water on their enthusiasm and commitment to open resources?

Appendix A: Codes of Ethics and Policy Principles from IDT and Related Professional Associations

Association of Educational Communications and Technology (AECT) Code of Ethics: <[https://aect.connected-community.org/globalcommunity/viewdocument/a-code-of-professional-](https://aect.connected-community.org/globalcommunity/viewdocument/a-code-of-professional-ethics?CommunityKey=73dca4fd-f722-4d27-9ead-018b464fca96)

[ethics?CommunityKey=73dca4fd-f722-4d27-9ead-018b464fca96](https://aect.connected-community.org/globalcommunity/viewdocument/a-code-of-professional-ethics?CommunityKey=73dca4fd-f722-4d27-9ead-018b464fca96)>

International Society for Performance Improvement (ISPI) Code of Ethics: <https://ispi.org/page/CodeofEthics>

International Society for Technology in Education (ISTE) Standards <https://iste.org/standards>

Association for Talent Development (ATD) Code of Ethics: www.td.org/about/vision-mission-code-of-ethics

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Diversity and Inclusion in Design for Learning and Human Performance Technologies

Lisa A. Giacumo

Bersin (Bersin & Enderes, 2021, Bersin, 2023) argues that the business case for diversity and inclusion is now proven, and promoting belonging and equity is our industry's new challenge of the decade. However, education systems are falling short of graduating individuals who have been historically discriminated against in most professional career tracks such as science, engineering, technology, and others (Pearson et al., 2022; De Brey et al., 2019). Organizational systems are falling short of recruiting (Adamovic & Leibbrandt, 2023) and developing lifelong adult learners into leadership positions (McCarty et al., 2005). Thus, it's clear that design approaches to advancing educational technology as well as learning and performance support systems must continue to adapt and change. Most instructional and learning experience designers are employed within universities, businesses, government, nonprofit, and military organizations. This means that programs intended to prepare researchers and practitioners should be aligned with these organizations' urgent, strategic needs. I posit that this means our research approaches, preparing researchers, and preparing practitioners, must also adapt and change. In this chapter, I will provide insight into the principles, practices, and trends that can inform this change.

It is helpful for you, as readers, to understand my own biases and where I'm coming from as you read this chapter. Currently, I am a faculty member at Boise State University, with a focus on organizational performance and workplace learning. I have pretty broad experiences in life, having lived in various places in the U.S. and also some time abroad in Europe. In addition to faculty life, I have consulted in corporate contexts, including nonprofit,

non-governmental (NGO), international NGO, educational, defense, and for-profit organizations.

I am a white, cis woman, over 45 years old, who is neurodivergent and has lived with both middle and low incomes. I share these attributes of my identity because they are characteristics of myself that I see devalued and othered in relation to my position of privilege and I want to ensure representation for advocacy reasons.

WHY PAY ATTENTION TO DEI ISSUES?

The growing strategic organizational focus on diversity, equity, and inclusion (DEI) in universities is evidenced by the recent emergence of chief diversity officers (Stroble et al., 2021; White-Lewis, 2022; Worthington et al., 2020). Unsurprisingly, researchers also describe an increased need to focus on cultural responsiveness, equity, and inclusion in educational applications (Liu, 2021; Eglash & Bennett, 2023). Further, scholars increasingly call for organizational leaders (Bisson et al., 2022) and instructional systems design practitioners to adopt more culturally responsive interventions (Ren, 2022; Young, 2021). Others call to develop more justice-minded practitioners because “we care deeply about the learner and the learner’s experience and how best to support that” (Kopcha et al., 2021, para 3).

Similarly, business leaders are increasingly focused on DEI. Hunt et al. (2018) published an industry report on behalf of McKinsey & Company consulting services which described their “growing awareness of the business case for inclusion and diversity” (p. 1). This focus on DEI is not solely altruistic. There’s global evidence that organizations, with increased gender, cultural, and ethnic diversity in leadership roles, tend to experience increased profitability.

Additionally, researchers have been publishing a growing body of research to tie workforce diversity and a sense of belonging with performance outcomes (Stamps & Foley, 2023) and organizational innovation (Khan et al., 2021). Some researchers have found evidence that suggests employee diversity can improve organizational performance outcomes. For example, Gomez and Bernet (2019) found that in diversity-friendly healthcare organizations patient outcomes improved, employees’ professional skills improved, frictions associated with change reduced, and finances increased. Other researchers have found evidence that increased diversity in board members can lead to better governance (Conyon & He, 2017; Liu, 2021) and increased financial performance (Loh & Nguyen, 2018). Thus, if you want to enable improved organizational business results (e.g., increased sales, engagement, profitability) as well as increases in learner engagement, satisfaction, innovation, and outcomes, you too want to facilitate a sense of belonging and embrace diverse organizational members’ identities at all levels when creating learning design and human performance technology interventions.

DEI TRENDS

Clearly, then, diversity, belonging, equity, and equality in learning environments and human performance support systems is a goal state. Diversity describes the wide range of human identities observed in learning

environments and organizations, including but not limited to different cultures, political affiliations, genders, sexual orientations, family situations, ages, socio-economic backgrounds, and abilities. Diversity is a fact that designers and researchers, their leaders, and their learners will encounter. What many in our field seem to struggle with is how to negotiate for adequate support (e.g., providing, receiving). Also, many in our field struggle to gain the expertise and perspective needed to facilitate ethical, fair, and meaningful outcomes for groups of individuals who have been discriminated against.

Building empathy and shared values across stakeholders can influence more respectful, inclusive, equitable, and fair design decisions, which maintains learners' dignity. Empathy can be used to uncover a wide variety of stakeholder and learner types, diverse motivations, goals, expectations, perceived barriers, experiences, contexts, etc. These concepts can be represented in empathy maps and different personas. When instructional or non-instructional intervention designs are built with empathy, they garner more buy-in and become more effective (Giacumo et al., 2024). Baaki and Maddrell (2020) describe how designers build empathy: 1) motivation to empathize, 2) discovery of stakeholders' situations and experiences, 3) immersion in stakeholders' worlds, 4) connecting to stakeholders' feelings and experiences, and 5) stepping back to reflect on new ideas and insights to support stakeholders (Kouprie & Visser, 2009). One example of empathic work has been to include more than just pictures of white, cisgender, straight, middle-class, etc. people who look like professional models in materials because the level of inclusion and belongingness becomes compromised as whole groups of learners can feel alienated.

However, it is presumptuous to think an instructional design team can achieve this desired state of equity, equality, and sense of belonging for diverse learners by building their own situational expertise and empathy for diverse learners' experiences alone. Researchers and practitioners can also find themselves at risk of unintentionally causing further harm to specific groups by omitting careful consideration for their own biases and past experiences and the systemic implications of their work on groups of individuals who have histories of discrimination.

Inclusion is the practice of appropriately incorporating individuals with diverse identities and needs into learning environments and human performance support systems in research, design work, and implementations, in ways that demonstrate respect for their needs and maintain their dignity. Inclusive design work, interventions, and research opportunities are accessible and engaging for the learners and participants they serve. Inclusive practices preserve learners' or participants' dignity and ability to engage with the systems, tools, or interventions. The Learning and Performance Instructional Design (LeaPS ID) model guideline number two states that whenever possible, guide inclusive processes by intentionally incorporating diverse individuals on design teams (Giacumo et al., 2024). Ideally, when resources and project scales allow, this is done at multiple points during each component of any given ID process, including empathizing and analyzing, design and development, and implementation and evaluation. Stark et al. (2021) describe four levels of participation design team members can take on, ranging from consultation to involvement to participation to co-design.

Therefore, researchers, leaders, and practitioners are currently focusing on several different facets of DEI work in design for learning and human

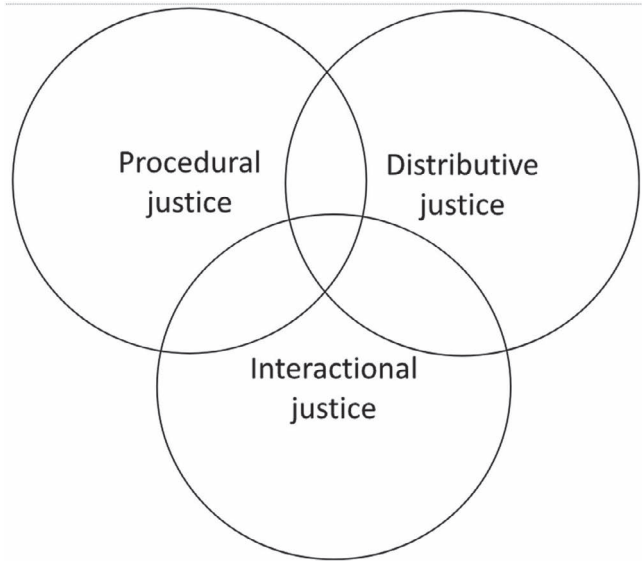
performance technologies (Asino et al., 2022; Breman et al., 2019; Breman & Giacumo, 2020; Lowenthal et al., 2020; Peters & Giacumo, 2020; Villachica et al., 2023). Some of these trends include organizational justice theory, inclusive and equitable design processes, universal design for learning (UDL), culturally relevant teaching and learning interventions, assistive technologies in learning environments, and digital equity, which we will explore next.

ORGANIZATIONAL JUSTICE THEORY

In order to maximize the positive impacts on organizations through DEI work, we need to create learning and performance technology interventions that are equitable, inclusive, and maintain the dignity of learners. The organizational justice theory has the potential to underpin our work in DEI-inspired learning environments, instructional design, and human performance technologies. This theory is explained through a widely accepted model that includes three components: procedural justice, distributive justice, and interactional justice (Karriker & Williams, 2009), shown in Figure 38.1.

Procedural justice describes the level of fairness in processes and procedures. Distributive justice can be used to describe the level of fairness and transparency in resource allocation. Interactional justice describes the level of dignity and respect in all forms of communications and interactions. Using these lenses to make project decisions can change the nature of design decisions or outputs. For example, Lewis and Sullivan (2012) describe an experience where a teacher in a position of power made an accessibility decision for a learner whereby the learner lost their sense of dignity in tradeoff for increased comfort of their teacher. Had the instructor taken the learner’s sense

FIGURE 38.1 Three-component model for organizational justice theory



Note: The three components (e.g., procedural justice, distributive justice, interactional justice) of organizational justice theory can be represented as overlapping and separate.

of dignity and ability to follow along during instruction into account, thereby increasing the learner's interactional and procedural justice perceptions, the learner would have been able to feel a better sense of belonging, decreased burden, and more engagement in the learning process. Another example is provided by Giacumio et al. (2021) when collecting data during a needs assessment to inform international development work. In this example, a distributive justice lens would change the nature of a participatory design process to include transparent resource allocation burdens for specific groups and the corresponding trade-off decisions in performance improvement interventions.

Why should we consider the implications of this industrial organizational psychology model in our work? Each of these three constructs can be found in both learning environment design and learning systems designs in organizations – thus the model is fundamentally applicable to our work. As environments and organizations become increasingly fair and just, members become more engaged and productive (Giacumio et al., 2021). And, researchers have found evidence that organizational justice can also affect a variety of aspects of organizational performance (Moon, 2017; Sartti, 2019) and workplace learning (Oh, 2019). For example, Moon (2017) found that as perceptions of some components of organizational justice increase, turnover rates and employees' annual performance review goal attainment ratings improved. Sartti (2019) found that as organizational members' perceptions of exchanges with their leaders and leaders' support improve, they perceive more organizational justice and also report more engagement in their work. Oh (2019) found that as perceptions of organizational justice increase, knowledge transfer also increases from bottom-up organizational (non-instructional) learning interventions as well as from top-down learning interventions.

Researchers are also linking the level of perceived justice to better performance outcomes as learners engage with learning and development interventions (Raduazo, 2021; Sarfraz et al., 2021; Wardana et al., 2023; Zeb et al., 2021). Other researchers have linked organizational justice to some measures of learning achievement and teachers' behaviors in K–12 schools (Kazemi, 2016; Burns & DiPaola, 2013). For example, Kazemi (2016) found that as perceptions of organizational justice increase, so do eighth- and ninth-grade students' grades. Burns and DiPaola (2013) found that as perceptions of organizational justice increased, so did organizational citizenship behavior, and demonstration of those discretionary behaviors also mediated some measures of student achievement. Li et al. (2022) linked university students' perceived levels of justice with their self-efficacy, including confidence, metacognition, and reflection.

Recently, researchers are working to reveal how organizational justice can appear in instructional design practice to increase learning and human performance systems in professional education and workforce learning through the applied principles of inclusive design and performance-based learning design (Giacumio et al., 2024; Frazier-Aich et al., 2023). For example, Giacumio (2023) describes an instructional design project for a client where the design centered learning by supporting graduate students in a professional education program who needed to make decisions to complete authentic job tasks (Giacumio et al., 2024). The design team decisions included input and feedback from stakeholders with diverse identities that ranged from consultation to involvement and participation (Stark et al., 2021).

This theory also has implications for data collection in applied organizational research as well as theoretical research in learning systems design and human performance technologies (Giacumo et al., 2021). Students in a Master of Science program often conduct organizational research throughout instructional design projects, needs assessment projects, evaluation projects, change management projects, or other similar data-collection projects. These projects will likely include the design, implementation, analysis, and interpretation of learner or participant responses (e.g., surveys, interviews, focus groups, questionnaires, performance observations). Doctoral students often engage with similar methods across larger populations to advance theory. More research is needed to continue to explore this theory's usefulness in predicting and explaining design choices that may yield great motivation or engagement, more effective intervention design, and the potential to yield better learning outcomes.

RESEARCHERS AND PRACTITIONERS HELP ENSURE BETTER PROCESSES

A second issue that we need to address in our field is balancing our design process expertise with the expertise of stakeholders, who are often more expert in specific organizational culture, performance gaps, and highly contextualized needs of learners with diverse identities. This includes building interventions that benefit all members of a given community or organization, rather than benefiting select individuals. Sometimes, competing priorities create barriers for some groups of learners and not others. When there are competing priorities, it's important to be explicit about these choices and their implications for individuals, groups, systems, and organizations or communities (Costanza-Chock, 2020).

To achieve systemic equity and inclusion, individuals with diverse identities likely also need to be at the design decision table and embedded throughout systematic design and research project processes. Interested and willing representatives of potential learners with diverse identities should be included at the very least in participatory design practices. Likewise, stakeholders who represent different interests in projects should be invited to share input and feedback regarding relevant project components. Ideally, representatives from the intended learners are included to the point of co-design with appropriate levels of ownership and attribution. Ideally, the productivity gains we are starting to realize from the integration of large language models (LLMs) such as ChatGPT in learning and performance technology design work will make space for the more human-centered work. It takes time to facilitate input, feedback, and garner buy-in through discussions with more stakeholders to achieve better representation and inclusion in project decisions.

Designers should solicit representative input and feedback originating from a wide variety of stakeholders who occupy different roles (e.g., intended learners, managers, instructors, clients, sponsors) in any given system or subsystem and who have diverse identities, and thus bring different perspectives, as one approach to building more equitable and inclusive interventions. This input and feedback should be sought out from these diverse perspectives at different points throughout an iterative design process to create equitable learning environments and human performance support systems. Designers

and researchers can advocate for this in a wide variety of ways with different levels of ownership for outputs.

For over 30 years, researchers have been urging instructional designers to focus on the common good and societal impacts (Kaufman et al., 1983; Yusop & Correia, 2012). Therefore, there is a trend toward respecting, acknowledging, and compensating contributors in ways they value and benefit from. In other words, we should also avoid extracting expertise without benefiting those who contributed to solution and intervention design in ways that are meaningful to them. We should follow appropriate cultural protocols for inviting input and feedback as well, which can vary in different contexts. In the next section, I explore this idea further.

HOW CAN RESEARCHERS AND PRACTITIONERS RESPONSIBLY USE DISAGGREGATED DATA, BUILD QUEER DATA, AND APPROACH CROSS-CULTURAL AND MARGINALIZED POPULATIONS?

The Equitable Data Working Group (April 2022) delivered recommendations intended to support equity in all government-funded programs and policy evaluation projects. The purpose of these recommendations was to allow leaders to “identify and remove barriers to equitable access to government programs” (p 2). This is interesting because of the inherent implications for evaluators and implied implications for scholars who are working on issues of equity and inclusion related to a wide range of contexts where individuals with backgrounds in learning design and human performance technology work. These include but are not limited to government agencies, defense organizations, healthcare, and most educational organizations.

In the past, data collection policies and efforts didn’t allow for fine distinctions in data analysis (Guyan, 2022). For example, groups of individuals who have been discriminated against, overlooked, or erased weren’t typically visible. Even if we did have some finer-grained labels for specific groups when we didn’t have an accepted theory or past evidence to suggest that we should look at how groups of individuals performed, considering these potential differences was considered “fishing” and avoided. Thus, I posit that the need for disaggregated data extends beyond the boundaries of program evaluation to include theoretical research.

Many theories, principles, frameworks, or approaches to learning and instruction only reliably apply to learners who are generally fluent in the language of instruction and don’t have special neurodevelopmental conditions (e.g., intellectual disabilities, communication disorders, autism spectrum disorder, attention deficit hyperactivity disorder, specific learning disorders, and motor disorders) or other health conditions. Most of the resulting work from this theory doesn’t describe or consider the limitations in an application for a very diverse learner audience. Thus, many e-learning design students who don’t come with a special education or multicultural education background must engage in a considerable amount of unlearning before they are able to create accessible learning interventions.

To ensure that designers and researchers are better equipped to complete needs assessments, evaluations, and theoretical research, they should employ techniques in their data-collection work that enable leverage of disaggregated

data, queer data, and ensure the validity of appropriate research methods related to cross-cultural and marginalized populations.

To engage in appropriate opportunities to explore disaggregated data, one can collect comprehensive data, explore intersectional data, and become more vigilant of data privacy, ethics, and transparency. Comprehensive data-collection approaches offer labels for specific groups within categories of interest such as race or ethnicity. Intersectional data accounts for the overlapping diverse identities that individuals have such as race, gender, sexual orientation, or abilities. Researchers have noted that when working with disaggregated data to explore intersectional data findings, one has to collect more quantitative data than typically done previously to ensure privacy as well as find meaningful patterns.

To engage in appropriate queer data building, one should first consider how this data could represent, hurt, or advance queer interests. If the data could support advocacy and access, then consider how to collect sexual orientation and gender identities, allow for self-identification, consider queer populations, and actively seek out queer individuals. Also, it's important to consider the tension in queer data that uncovers values, worldviews, and inaccuracies (Guyan, 2022). Queer data not only considers queer as an identity label but also the queering of research methods, which also investigates categories, exclusions, and power relationships (Guyan, 2022). Potential areas for research include workplace learning and performance issues, cyberbullying, assisting at-risk learners, media for empowerment, and identity construction in mediated spaces (Subramony, 2018).

There are different ways to approach research and design that responsibly consider the interplay of identities, learning, and technology, work that is cross-cultural and in support of populations that have been marginalized (Benson, 2018). Asino et al. (2022) describe the foundations of cross-cultural design theories and models. Asino et al. (2017) review theoretical frameworks to guide new design, development, and research of learning environments from a cultural perspective. There are specific methods and approaches to use when engaging in cross-cultural research, especially within marginalized communities or organizations that incorporate or serve individuals from marginalized populations (Giacumo et al., 2021; Peters & Giacomo, 2020). Becoming well-versed in these approaches and methodologies is of growing importance to diversity and inclusion efforts in design and performance support technologies.

WHAT CAN UNIVERSAL DESIGN FOR LEARNING (UDL) HELP RESEARCHERS AND PRACTITIONERS DO?

Over 20 years ago the concept of UDL was borrowed from architecture to be implemented as “a new paradigm for teaching, learning, assessment and curriculum development” (Pisha & Coyne, 2001, p. 198). It promised that when materials and methods are designed for all learners in ways that allow them to recognize patterns in sensory data, allow one or more strategies to decode and make decisions based on the perceived patterns, and be engaged by both the strategies and their application with sensory data, learning will be accessible (Vygotsky, 1978, 1986; Pisha & Coyne, 2001). When we apply the theory of organizational justice to UDL, we realize that requiring additional

accommodations during implementation can jeopardize learners' sense of dignity and disrupt procedural equity.

Some of the most widely recognized research and applied practice trends in this area include the consideration of personalization and differentiation, adaptive learning systems, assistive technology, accessibility standards and student outcomes, multimodal learning, social-emotional learning, inclusive assessment, teacher and instructional designer training, communities of research and practice, educational policy development, cultural responsiveness, equity, and inclusion. There is growing interest in the use of UDL to support learning beyond traditional educational settings, including workplaces, museums, and libraries.

To further advance UDL work, it is important to continue to invest in new research and educational development to ensure accessible materials and methods for all learners. As new technology becomes available, the level of accessibility for all learners can easily change as the affordances of technology applications also change. We can continue to deliver great value in figuring out how to best integrate emerging tools for learning and development interventions for all learners. Unfortunately, we are starting to re-learn this lesson all over again as growing evidence shows that teachers and facilitators are not always comfortable with integrating technology applications in classrooms and educational technology experts are still needed (Klein, 2023). Further, there's evidence that IDs with specialized technology applications (McCarthy et al., 2023; Nielson, 2023) and technology expertise will also continue to be necessary in workplace learning (Nworie, 2022) and higher education (Xie et al., 2021) intervention design as well.

WHY IS IT IMPERATIVE TO PRODUCE CULTURALLY RELEVANT TEACHING AND LEARNING INTERVENTIONS AND RESEARCH?

Instructional practices as well as learning and development practices, which are culturally relevant and responsive (CraR), center diverse backgrounds and experiences as assets (Chandrasekera et al., 2022). It's important to center these practices so that all learners feel a sense of belonging, dignity, and value. This is especially important for learners who are from groups that are discriminated against and often disadvantaged. It's important to produce culturally relevant research so that members of groups that are discriminated against, vulnerable, and often disadvantaged, can be recognized (Benson et al., 2023) and equitably benefit from advances in science, technology, policy, and government-funded programs and services (Giacumo & Asino, 2022; Horsman et al., 2021; Pearson et al., 2022).

Some ways to build CraR teaching and learning interventions could be to include resources, activities, or content that incorporate relevant cultural identities, experiences, cultural knowledge, or related interests and expectations. Other approaches could include building opportunities for facilitators or learners to develop stronger relationships with relevant cultural communities through project work, service, networking, and other relationship-building activities. These kinds of interventions have been shown to have a number of benefits, which include improved learning and performance outcomes, increased motivation and engagement, improved self-esteem, and increased retention rates.

Regardless of what approaches we take, they should be authentic to the goals, expectations, and experiences of the learners and communities they represent. In certain instances, if there are established resources, communities, and events readily available, this authenticity can be easier for researchers or designers when they themselves are cultural insiders. However, there are times when cultural insiders won't be able to access resources or events and community input, or to produce culturally relevant teaching and learning interventions. It's important to avoid assumptions that those with insider identities have access to or have adequate resources and incentive systems to involve larger communities in specific projects.

When a researcher or practitioner is going to work across cultures to produce culturally relevant research or teaching and learning interventions, especially with groups that are discriminated against, vulnerable, or disadvantaged, there's often real potential for unintended negative consequences. In these situations before beginning, cultural outsiders would ideally engage in considerable self-reflection and develop cross-cultural competence or expertise related to the specific cross-cultural work. Ideally, researchers or practitioners who are cultural outsiders also work with partners who are cultural insiders to engage in cross-cultural project work.

WHAT IS THE CHANGING LANDSCAPE OF DIGITAL EQUITY?

In the 1990s, digital equity research focused on access to computers and the internet or the digital divide between those who have and those who have not and the outcomes on different demographic groups. Researchers explored geographic disparities, the influence of socio-economic factors on access, the role of schools in providing access and supporting learners' digital literacy and skills development, gender disparities, community technology centers, public policy and advocacy, global efforts to bridge the divide, its effect on educational outcomes and employment opportunities, and case studies of best practices.

More recently, there is growing recognition of digital equity in schools but also society at large. For example, broadband infrastructure and device access are now required in formal educational settings, telehealth, and many essential services. Digital literacy gaps regarding the skills needed to safely navigate the digital world and participate in respectful, democratic dialogue and civic processes, are currently of concern. Policy changes have included measures to resolve the homework gap with take-home devices and hotspots, net neutrality, data privacy, and more regulated internet access. Concurrent enrollment programs between high schools and universities, private businesses, and start-ups, are offering options for lower-cost education and training opportunities with the goal to expand access, upskill learners of all ages, and create more diverse talent pipelines. The ecosystem of nonprofits, community groups, libraries, and schools has broadened to create more digitally inclusive opportunities for access to different resources. The focus on equity in education has also expanded by providing more resources to learners who would otherwise lack access because of the now widely accepted impacts on learner success. There are now international organizations and initiatives that seek to address digital equity in education and training on a global scale. We have now realized that those who have grown up with computers and mobile

devices face some of the same equity challenges as those who did not. In short, we are realizing, although computers, tablets, smartphones, and the internet have been widely available for more than one generation, many are not able to access, select, use, or create digital content or engage with communities in ways that are useful to achieve specific learning and development goals or performance outcomes.

Summary of Key Principles

1. **Apply organizational justice theory and consider the greater societal good to guide all instructional design work.** Ensure that different groups of learners each have a fair chance to access all components of the learning process, learning environments, the resources required to fully participate, and experience interactions which maintain their dignity and are respectful.
2. **Integrate samples of learners with diverse identities, as well as stakeholders with different perspectives of the system and/or sub-systems where interventions are to be integrated, into project processes.** Collect their input and feedback at multiple points throughout all components of ID project processes. Communicate how their input and feedback are applied in project design decisions appropriately to each stakeholder group.
3. **Draw upon UDL principles to guide data-collection processes and design project decisions, in the creation of all tools and deliverables, such that no groups of learners are more burdened than other groups of learners whenever possible.** Whenever it's not possible to maintain equity and inclusion in project work, be clear and explicit with stakeholders about which groups of learners will be more burdened, how, and the potential consequences of the barriers.
4. **Whenever possible, eliminate the need for additional accommodations during the implementation of interventions.** Rely upon relevant theory and applicable evidence-based practices in all project work (e.g., research, practice). Keep in mind that theory and evidence-based practice will evolve as technology evolves and we increasingly understand more about how to better support learners. What was a best practice in the past may not be in the future.
5. **Ensure that all interventions (e.g., instructional, learning and development, performance support) are culturally relevant, sensitive, inclusive, authentic, and responsive to diverse learners' needs.** Each person has biases and blind spots, as does each individual designer. While one can and should build empathy and better cultural competence, one should never assume they know best for learners with different identities and experiences without getting their input and feedback. Researchers and IDs must engage in extensive self-reflection, build empathy for those who would experience the outputs and consequences of their work, and incorporate diverse stakeholders with authentic experiences into the work.
6. **Advocate for inclusive and equitable policy frameworks to drive equitable practice decisions and work toward digital equity.** Ethics

evolve and change with societal expectations. Thus, embracing a

commitment to lifelong learning will be required to achieve equity.

Application Questions

1. The People's Food Bank (pseudonym) delivers 100,000 meals annually to beneficiaries who are food insecure in a large urban area. A small group of full-time employees are responsible for managing the operations and rely upon a very large group of volunteers to meet their mission. The organization has recently built a new warehouse with state-of-the-art computerized systems, which is a change from their previous paper-based systems. They have asked you to consult with them to develop a new learning and development (L&D) strategy. Given what you've read in previous chapters and this chapter:
 - What would be the pillars of this new L&D strategy?
 - How would you work with them to address issues related to digital equity?
2. Your colleague works in an international nongovernmental organization that aims to provide access to high-quality K–20 education and training for individuals living in remote, sub-Saharan Africa. Five of their partner schools with embedded community training programs are retaining 40% of the teachers after five years and learners are graduating programs at only 58%. Ideally, they would retain 80% of their teachers after five years and graduate 90% of the learners on time. They have issued a request for proposals (RFP) for a consultant to conduct a needs assessment to uncover the root causes of the performance gap and help them identify a set of interventions to address the performance gaps.
 - What would you include in your project proposal?

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Changing Conceptions of Design

Elizabeth Boling and Kennon M. Smith

Drawing on studies of design philosophy and practice in traditional fields like architecture, product design, graphic design, and design engineering (e.g., Kozma, 2023; Lima, 2023; Lupton et al., 2021; Norman, 2023; Zeki, 2019), it is possible to consider critically the true nature of what we do as instructional designers. For multiple decades, the mainstream view in the field of educational technology has been that we are a science (Li, 2020; Merrill et al., 1996), perhaps including a bit of art, although the art is not discussed in as much detail (Richey & Klein, 2010). Those who question the scientific view of instructional design have sounded regularly over time and have shifted the discourse. As scholars across disciplines examine the nature of design and invest serious attention in its study, and as scholars within this field have paid attention to that work (e.g., Earnshaw et al., 2018; Hokanson & Gibbons, 2014; Hokanson et al., 2015; McDonald, 2023; Moore, 2021; Rowland, 1993), new views of design have been emerging within educational technology.

DOMINANT CONCEPTION OF DESIGN IN THE FIELD OF EDUCATIONAL TECHNOLOGY

Review of the educational technology literature reveals that the term “design” is used frequently and inconsistently. Seels and Richie (1994) have identified several common uses of the word. Of these, perhaps the most widespread conception of design currently is as one of the steps, or concepts, in a process-centric, ADDIE-type model that is tied to the scientific view of the field. By contrast, as we argue, this view is changing and should change. We use the term “design” in a broader sense: as encompassing the total endeavor – fully rigorous and accepting of scientific knowledge as one of its primary tools (Nelson & Stolterman, 2012) – required to improve learning and performance.

The way in which we frame our understanding of design is of no small consequence for research on and practice of design in this field. Over the last 60 years, tremendous effort has been invested in developing systems-based

process models to guide instructional design work. There are now more than 100 such models (Branch & Dousay, 2015). These models have become so pervasive and influential in framing our understanding of instructional design thinking and work that they are sometimes seen as the embodiment of our design knowledge. Dick (1997) states, “our models have been quite useful to us in terms of summarizing the research and procedures of many contributors to our field. Our theory, as represented in our models, can be seen as a succession of ‘if-then’ statements” (p. 47). An implication of this statement is that design (in the larger sense of “what we do”) is ideally conceived as driven by scientifically established solutions to every potential situation and communicated through if-then statements which can be selected by following an appropriate process model.

Both process models and the predominant understanding of design as a component within them have remained remarkably stable in the field of educational technology. For example, Piskurich (2015) states, “Instructional design stripped to its basics is simply a process for helping you to create effective training in an efficient manner” (p. 1). Branch (2010) explains ADDIE (analyze, design, develop, implement, and evaluate) as “a product development paradigm” (p. 1) in which each phase “generates a deliverable . . . [which] is then tested prior to becoming input for the next phase in the process” (p. 4), and more explicitly positions it as “a generic product development process” (p. 89) depicted as a visual model in 2019 (Branch & Stefaniak, 2019). Reigeluth and An’s (2020) Holistic 4D Model of ID incorporates cycles of formative evaluation and guidance for designers from theory while also emphasizing a focus on learners but is likewise divided into several consecutive phases, of which “design” in three layers is one phase.

Of course, educational technology is not the only design field in which process models emerged during the 1960s and 1970s (e.g., Alexander et al., 1977; Jones, 1970). Process models, or conceptual models used as tools for designing, emerged at this time in many design fields (Gibbons et al., 2014). Comparatively quickly, however, “process . . . pursued as an end in itself resulted in abject failure” (Rowe, 1987, p. 111). Examining possible motivations for the seemingly simultaneous development of these model-based understandings of design across a number of design fields may help explain the persistence of this view in educational technology, even while it was radically subordinated in others. In his analysis of the move to focus on process models in traditional design fields, Cross (2007) ascribed at least some of the activity to “aspirations to scientise design,” the most positive aspects of which were efforts to establish modern design as “distinct from pre-industrial, craft-oriented design – based on scientific knowledge” (pp. 119–121). Along with the effort to make design scientific, we can see the concern that if design is not scientific, then it has no basis for any claims to validity. Merrill and colleagues (1996) expressed this latter view:

Instructional design is not merely philosophy; it is not a set of procedures arrived at by collaboration; it is a set of scientific principles and technology for implementing these principles in the development of instructional experiences and environments. . . . Too much of the structure of educational technology in general and instructional design in particular is built upon the sand of relativism, rather than the rock of science. When winds of new paradigms

blow and the sands of old paradigms shift, then the structure of educational technology slides toward the abyss of pseudo-science and mythology. We stand firm against the shifting sands of new paradigms and “realities.” We have drawn a line in the sand. We boldly reclaim the technology of instructional design that is built upon the rock of instructional science.

(p. 7)

Parrish suggests an ongoing perceived advantage of categorizing instructional design as science in his acknowledgment that “it is as applied science that an explanation of ID is easier to swallow for those outside the discipline” (Parrish & Nelson, 2017, p. 7). Introductory instructional design textbooks continue to routinely describe the field as a science, as exemplified in Brown and Green’s (2020) statement, “Instructional design is the linking science that applies logic and scientific methods to the problems involved in designing and developing instruction” (p. 20).

Arguments calling for a move away from the process orientation in instructional systems design (ISD) have, until recently, been hampered in part by two related assumptions. First, that process orientation is a prerequisite for serious, scientific work and, second, that art is the opposite of science. It is possible to see the view that art and science are the primary, or the only, traditions by which educational technology can identify itself played out in the exchange between Dick (1995) and Rowland (1995) in *Educational Technology*. Dick, taking his lead from some critics of ISD, squares off “creative” (or artistic) design against “systematic” (or scientific) design, with the underlying assumption that if one does not practice scientifically, one must therefore practice artistically and, presumably, with a resulting lack of rigor or credibility. The idea that ISD is a comprehensive science which guarantees successful design outcomes is persistent and, in some cases, fully entrenched in the field (see, for example, Hodell, 2021).

We challenge the art versus science assumption directly, and in so doing eliminate the need for the related “process-model as science” assumption. Instead of viewing these traditions as oppositional, it is possible to see art and science as distinct traditions with some fundamental commonalities – particularly the search for overarching truths (Gold, 2007) – and to see design as a separate tradition (Nelson & Stolterman, 2012) with its own ways of knowing and of building knowledge, driven by the search for “the *ultimate particular* – the specific [instance of] design” (p. 33; italics in the original). In our view, an argument such as that put forward by Merrill and his co-authors (1996) sets up a false choice between science and not-science, and any advantage gained by defining instructional design (solely, or even primarily) as a science is outweighed by opportunity costs bound up in limiting instructional design to such a paradigm. This includes the cost of assuming that designing can be improved by improving its predictability and expending intellectual effort to do so, while failing to focus our efforts on the capabilities required to engage with and be effective in the perpetually unstable state of every context in which design is practiced (Stolterman, 2021). We posit that instructional design does not need to cast itself as a science in order to retain legitimacy, but that it can position itself within the design tradition and still draw upon scientific principles and processes, as well as art traditions, as needed.

EVOLVING THE VIEW OF DESIGN IN THE FIELD OF EDUCATIONAL TECHNOLOGY

As early as 1983, Kerr made an empirical attempt to discover what designers were actually doing as they worked and concluded that our field needed to examine links with other fields of design. Almost ten years later, Murphy (1992), employing a framework from Lawson's *How Designers Think* (1980), compared the generalized characteristics of design to those of the problems we address in our field and argued that the two were congruent. He sent out a plea to his colleagues to "look and learn from the design world" (p. 282), a point of view persuasively argued by Rowland in 1993 with reference to multiple domains of design. In 1997, Davies called for radical parallelism in the activities of design – that is, "determining goals while designing impact prototypes and simultaneously identifying appropriate subject matter content" (p. 41), and for acknowledging the chaos of the real world in our design processes. Taken together, Davies's recommendations imply a serious erosion of the central position of the process model, if not an actual repudiation of our identity as a science. Wilson (2005a, 2005b) carried these notions further when he observed the need to consider "practitioner perspectives as a needed antidote to the surfeit of high-road theory and privileging of science over other ways of knowing and doing" in the field and calling educational technology "a legitimate field of endeavor in its own right" (2005b, p. 11). His extensions to the foundations of the field imply broadening our view of design to incorporate "often neglected aspects of design . . . moral and value layers of meaning and the aesthetic side of our work" (2005a, p. 15).

Yanchar and Gabbitas (2011), in challenging the validity of eclecticism, a common (and process-centric) position in the field regarding the use of theory, introduce the notion of critical flexibility as a rigorous form of what Nelson and Stolterman (2012) might term "designerly" judgment, placing designers at the center of design activity. A clear implication of Parrish's (2009b) position is that methods (e.g., storytelling) might occupy a key position in designing and, therefore, a process does not itself produce design outcomes. Smith and Boling (2009) argue that our demonstrated understanding of design in the field carries with it multiple limitations, not the least of which is the failure to see designers as a key resource in designing. Rowland (2008) explores the notion of educational technology design as "a fully developed system of inquiry for educational contexts" in which "design and research would transform each other . . . as independent inquiries . . . with formal intersections" (p. 7). In this view, design is cast as a legitimate form of knowledge building equal to traditionally recognized research and functioning in partnership with it; the two would work together to produce true innovations in education. More recently, Rowland (2021) and others (e.g., Stefaniak & Xu, 2020) argue that many of the field's traditional process models have emphasized systematic approaches to design, while insufficiently attending to broader, systemic approaches. None of these authors has advocated turning entirely away from the rational in design, although they do call into question the centrality of the process view and its limitations for addressing complex, mutable, human situations.

It remains true over time that practitioners do not use many of the tools for design that scholars develop and teach in this field (Cox & Osguthorpe, 2003; Lachheb & Boling, 2018; Rowland, 1992; Stolterman et al., 2008;

Visscher-Voerman & Gustafson, 2004). Worse yet, while these tools are expected to support us effectively in teaching ISD (Branch, 2010; Dick, 1995), design researchers argue that such tools can defeat the development of design expertise (Boling, 2017; Lawson & Dorst, 2009; Orr & Shreeve, 2018). Partially in response to this situation, individuals and groups within the field of educational technology are establishing a more varied landscape of tools for design and perspectives on design than that which has prevailed in recent decades. Scholars are adapting ideas rapidly from traditional and emerging fields of design (e.g., architecture, product design, human–computer interaction design, software design) and working to integrate them with existing ideas.

ESTABLISHED, EMERGENT, AND REVIVING CONCEPTIONS OF DESIGN IN EDUCATIONAL TECHNOLOGY

Design as Problem-Solving

In 2008 Jonassen put forward a model centered on the conception of design as problem-solving. This was described as countering Silber's (2007) model of designing – as primarily the selection and application of principles – with a different view informed by similar sources but presented as a cyclical process. In Jonassen's process, designers build a “design model that represents the proposed solution” (p. 24), both responding to constraints (technological, economic, political/organizational, environmental, learner-related, and physical) (p. 23) and creating new ones as they iterate through cycles of decision making. In this model of designing, designers' biases and beliefs impact decision making on a par with other constraints (p. 23), and the nature of design action seems to resemble disciplined action within a metaphorical space versus prescribed steps along a path.

Design as Space

In the literature on design and design theory, design is frequently conceptualized as a space rather than a process. This space exhibits several “invariant features” distinguishing design from other forms of problem solving (Goel & Pirolli, 1992, p. 395). Design space is described in two parts (problem space and solution space), each constantly shaped and reshaped by designers who execute disciplined moves that both affect the outcome of designing and are affected in their turn by subsequent moves (Cross, 2004). Using this conception of design space, within which a single, general process model – or a panoply of specific ones – cannot provide the direction required to transform from goal state to end state, design scholars with a cognitive orientation across many disciplines are establishing new value for broad design knowledge and what is frequently termed design thinking (Cross, 2011; Davis, 2017; Lawson, 2019; Lawson & Dorst, 2009), and recognizing the nature of design as cutting across disciplines (Durling et al., 2009; Goel & Pirolli, 1992). Design thinking is viewed as separate from other modes of thought and valued in practice (Brown, 2008; Cross, 2007). Design knowledge and action are viewed as legitimate and important objects of study, and design is seen as a distinct form of knowledge building (Boling, 2008; Dorst, 2007; Lawson, 2005; Stolterman et al., 2008).

Design as a Tradition Separate From Art and Science

This view of design as a distinct tradition, which centers on the multiple activities of designing and characterizes them all as “design,” can likewise be understood to encompass everything that we do in ISD (e.g., design research or analysis, prototyping evaluation, production) as part of design (Nelson & Stolterman, 2012). The design tradition, as it is conceived in this way, is different from – and exists on a par with – science, although it does use and rely on science, just as science uses and relies on design (Baird, 2004; Gibbons, 2013; Nelson & Stolterman, 2000; Rust, 2004). Within this view, designing is viewed as action toward concrete, although not comprehensively describable, goals within a complex conceptual space comprising possibilities and constraints in which the designer(s) and not their tools are the primary force resolving tensions into results (Boling, 2008; Cross, 2007; Goel & Pirolli, 1992; Lawson, 2005). Requirements for action with this space include disciplined practices like the exercise of judgment, including judgments regarding process decisions (Gray et al., 2015).

Design as Systems Work

Carr-Chellman and Carr-Chellman (2020) provides a systems perspective on design in the field, reviving the complexity of this view to address the ways in which that complexity, versus the simplification represented in current practice and thought, reconceptualizes design as action within broad as well as specific human systems. Another form of this conception of design is represented in Gibbons’s (2013) exploration of issues surrounding the knowledge educational designers (he uses the term “technologists”) use and how that knowledge is represented, drawing from diverse fields of design practice, especially engineering and architecture. He offers a view of design centered on the product of design rather than the process of design. In this view, instructional designs are a system of layers, each characterized by unique design goals, constructs, theoretical principles, design and development tools, and design processes (p. 23). Related to this view of designing, Gibbons and Brewer (2005) explain that designers in multiple fields benefit from “the identification and use of design languages . . . [that] supply the set of structures and structuring rules used to complete designs within each layer” (p. 111), which is, notably, different than developing a design model. They enumerate multiple benefits that would accrue from a program of design language study within the field.

Design as Designer-Driven Action

In contrast, Schwier et al. (2007) focus on designers themselves, describing them as “active, moral, political and influential” change agents (p. 1) operating within an emerging model that includes “interpersonal, professional, institutional and societal dimensions” (p. 2). Their model of agency stresses moral commitments, responsibilities to people and the profession, and contributions to significant social influence. Their findings are congruent with the views of scholars who place character at the center of design (Nelson & Stolterman, 2000). Osguthorpe and Osguthorpe (2007) explore issues related to the character of designers, discussing conscience and personal beliefs within an

extended framework that includes historical, psychological, sociological, and philosophical foundations. These issues are increasingly at the forefront of debates regarding design, as scholars and practitioners confront the undeniable reality that traditional design practices and products have often played a part in the disenfranchisement of groups and individuals. Scholars are questioning how design can be reconceptualized to address existing inequities and contribute proactively to social justice (Benson et al., 2017). Boling (2008) addresses the necessary qualities of designers. Drawing on the concept of the human instrument (Lincoln & Guba, 1985), she posits that the designer, or design team, is the only instrument complex and responsive enough to act within situations that are not comprehensively knowable. The designer's skill cannot be reduced to an algorithm, a set of principles, or a process diagram (Lachheb & Boling, 2021).

Design as Principles-Driven Action

Principles, either as a set of prescriptions or as core drivers for design, or sometimes both, serve as the central concern in several active conceptions of designing within the field. These forms of principles-based design (i.e., conceptions of design in which the drivers of decision making are based primarily in principle versus process) exist in the field as established perspectives, emergent perspectives, and perspectives being revived or reconsidered. Several established perspectives include: 1) instructional theories, "sets of goal-oriented, normative, artificial-science principles" (Reigeluth & Carr-Chellman, 2009, p. 19) "pertaining to various aspects of instruction" (pp. 8–9) which are applied contextually to increase the likelihood of effective outcomes; 2) first principles that characterize effective designs and guide the moves made by designers (Merrill, 2002, 2015, 2021); 3) universal design, which is organized around three major principles (multiple means of engagement, representation, and action and expression) and which has matured into a prescriptive design theory now appearing in other frameworks (Gronseth et al., 2022); and 4) quality matters (QM), a highly structured system of principles for the design of online courses, has "grown" in official adoption from 365 institutions to over 1000 between 2012 and 2021, despite critique of its drawbacks (Anderson, 2021). Inclusive design (Brooks & Grady, 2022; Thomas et al., 2002; Young, 2008; Young & Asino, 2020), ethical design (Moore, 2021), and sustainable design – a strong focus in multiple design fields but barely emergent in educational technology (Huang, 2011; Bodily et al., 2019) – are additional principles-based design perspectives with presence in the field.

Design as Action Shaped by Philosophy

While various forms of principles-based design are discussed and practiced in the field, they generally conform to the same philosophical orientation, namely, that the core values of instructional design are outcomes identified as efficiency, effectiveness, and appeal or engagement (Honebein & Honebein, 2015; Merrill, 2013). In the definition of Learning Experience Design (LXD) as "a human-centric, theoretically-grounded, and socio-culturally sensitive approach to learning design, intended to propel learners towards identified learning goals, and informed by User Experience Design (UXD). methods"

(Schmidt & Huang, 2022, p. 141), there are clearly different philosophical value positions from the traditional and ubiquitous philosophical triad of efficiency, effectiveness, and appeal. Here efficiency is not evident, effectiveness is alluded to through grounding in theory and identification of learning goals but is aspirational versus determinative, and appeal has been replaced by far weightier constructs which occupy the central position of value. As an emergent and alternative philosophy within the field, LXD also represents a shift in the conception of design, namely, that whether or not design is viewed as a model-driven enterprise or one driven by the disciplined judgments of its practitioners, it is an enterprise strongly influenced by the philosophy of its practitioners. That influence is strong enough to make LXD appear as though it is a different field altogether (Jahnke et al., n.d.), entailing as it necessarily does the use of multiple theories from learning, instructional and educational sciences (Jahnke et al., n.d.), storytelling and aesthetics (Wilson, 2005a; Parrish, 2009a, 2009b), relatively recent methodological tools from UXD (Schmidt & Huang, 2022), and resurrected craft-based knowledge once termed message design and visual literacy (Fleming & Levie, 1993; West et al., n.d.). Appearances notwithstanding, as Gray and Boling (forthcoming) note, “most fields have many extant philosophies in play at the same time, with some more dominant than others,” and LXD bears the hallmarks of a philosophy within educational technology broadly construed. Its emergence opens the path for more philosophies to arise, or coalesce, in the “philosophical desert” (p. 704) of the field and offers a significant shift in the conception of design within this field.

IMPLICATIONS OF EMERGING VIEWS ON THE NATURE OF DESIGN

No single perspective is emerging to replace reliance on process models as the core of designing within the field, and we would argue that this is appropriate. While a broader, more complex view of designing seems to us to be needed in educational technology, it would be a waste to spend our collective effort seeking to capture this view in a single unifying model or theory of designing. The perspectives we have addressed here are representative of those which speak particularly to our conceptions of design, rather than a catalog of all perspectives, and it is important to recognize that most are not mutually exclusive. If one entertains the view that design is a valid (and complex) tradition, not a subset or practical application of some other tradition, we see a number of implications for what we would do as a field.

1. *Discriminate more carefully than we do now between building scientific knowledge and building design knowledge.* We would not continue to study a single design in a single context, or the process of creating a single design, and then attempt to generalize principles from that study to all other designs or even to all other designs of that general type. Unless the designs are crafted as research vehicles intended to provide data regarding other phenomenon (e.g., cognitive process, social/psychological behaviors), such studies are not valid science regarding the effectiveness of designs or technologies, and their singular focus on a through line from theory to design outcomes renders them also unusable as design knowledge (Boling, 2018). We would study more individual designs in

context and disseminate rich descriptions of those designs as valuable contributions to the expertise of all designers in the field (Boling, 2010) and invest more true scientific study in how design actually functions in order to ground our theories and prescriptions for design (Boling et al., 2017; Gray et al., 2015; Lachheb & Boling, 2018).

2. *Value some types of knowledge and knowledge building differently than we do now.* Precedent, the unique body of work as experienced by each designer and drawn upon for both specific and general purposes in designing, is a specific example (Boling, 2021). We have too many principles (theories) that leave designers still floundering for appropriate moves and too few examples on which to build true expertise (Boling & Smith, 2009). Craft, or skill situated in a domain (Risatti, 2013), is another example. Instructional design theory does not bridge the gap between articulated strategy and actual instruction; the knowledge to do so has been present but invisible in our field, as in others (Sless, 2008), and needs to be recognized as a viable area of study. We would also privilege empirical understanding of what designers do and how they do it, using this understanding to develop tools and guidance for improving instructional design – instead of developing such tools and guidance in the absence of that understanding and conducting empirical studies to prove that designers are not using them (Stolterman et al., 2008).
3. *Learn more about standards for discipline and judgment in design and work to establish such standards within the field.* Instead of striving to identify the correct way to carry out design, or the definitive principles for producing different classes of design outcomes, we would define the parameters of disciplined judgment and action in design. Those parameters would place responsibility onto designers and design teams for recognizing and shaping the design space and employing appropriate processes and principles within it. While we place this responsibility on designers now by leaving the hard work of translating simplistic (or sometimes overly determined) models into meaningful action, that work is currently viewed at best as devising ingenious workarounds in response to constraints that prevent the ideal process from being used, and at worst as guilty deviation from a standard, or ideal, model (Boling et al., 2011).
4. *Expect a broader range of capabilities from the instructional designer.* Just because what we offer by virtue of our design knowledge may be better than what people had before does not mean that what we are offering is good enough or that we are viewing ourselves in the largest sense as guarantors of design – responsible for the decisions we make about what we work on, for how we do that work, and for all the consequences of what we create (Nelson & Stolterman, 2012). Such responsibility calls for designers who are prepared far beyond their cognitive grasp of instructional theory, their ability to follow a certain process, and even their ability to conduct an empathetic, productive subject-matter expert interview. Such a responsibility calls for us to place emphasis on developing the design character of our students (Nelson & Stolterman, 2012; Korkmaz & Boling, 2014). Aspects of professional character for designers should include a commitment to being conversant with social justice issues (Bradshaw, 2018), engagement with the role of design in broad issues of ethics (Moore & Ellsworth, 2014), and the ability to engage in co-design and to

recognize limitations of individual designers based on their positionality (Cuff, 2023). We have to question the widespread view that starting our students off with a highly simplified representation of what we do is “a reasonable strategy for teaching a process to novices” (Dick, 1995). Lawson and Dorst (2009) quote Wim Groeneboom, “one of the founding fathers of the faculty of Industrial Design Engineering at TU Delft [Delft University of Technology, originally established 1842]” as saying:

The big disadvantage [of design methods] is that through this kind of teaching we take away the insecurity of the students. It is a way of quickly and efficiently explaining design but that is deadly. Students have to learn to deal with uncertainty, and we take that away by this kind of teaching. . . . In the end, I would say that dealing with uncertainties is the core of our design profession.

(p. 33)

Uncertainty is a feature of design (and of design education), not a bug to be eliminated. While uncertainty can be an uncomfortable state, particularly for novices, other disciplines are actively acknowledging its importance as a component in design education (Osmond & Tovey, 2015; Smith, 2013). Equipping students with the capacity to recognize, tolerate, and communicate with stakeholders about uncertainty, even in the earliest stages of their ID educational experiences, is vital to their future success.

5. *Recognize that this field can encompass multiple philosophies.* As is true for other fields in which the core practice is design, however systematic or not, the question of which aspects are most highly valued in designing and, consequently, which tools, processes, and forms of knowledge are prioritized does not change the domain in which that field is situated. Architects who design from a core of concern for the human activities facilitated by structures and those who design structures intended as social and political moves in development of the built world use different theories and tools but are still identified as architects (e.g., Cuff, 2023).
6. *Expand and maintain awareness of related domains of research and practice to capitalize on areas of relevance to our work.* Although questions and tensions exist over whether or not they are separate fields (Lee, 2023), both learning sciences and learning engineering are engaged in provocative and potentially productive work as it relates to educational technology. Conceptions of design in the learning sciences center on design-based research (DBR), in which the research identity of the designer is foregrounded. Conceptions of design in learning engineering center on data-driven design in which systematic processes, often involving big data, are employed to verify the effectiveness of learning interventions (Svihla, 2014; Goodell, 2023). From these perspectives, instructional designers should draw useful knowledge to be incorporated into well-informed design practice.
7. *Begin to grapple substantively with the implications of generative AI for conceptions of design in this field.* In addition to all other issues raised by the rapid developments in both textual and visual forms of generative AI,

questions regarding how our conceptions of instructional design could be impacted loom large. As Vampiri et al. demonstrate in their 2023 study of game designers, in fields where the current conception of design offers an active and instrumental role for the designer, the core conception may not change so much as allow for a multifaceted set of concerns (p. 15) to be navigated, in large part through the instrumental judgment of designers. In educational technology we may face a situation in which conceptions of design which are taken for granted lead to a familiar cycle of anticipating massive positive change made possible by technological innovation (Escotet, 2023), approaching that technology with existing conceptions of design and designing (Leiker et al., 2023), and eventually realizing far less benefit than anticipated (Amiel & Reeves, 2008; Glazewski & Hmelo-Silver, 2019; Selwyn, 2013; Spector, 2001).

CONCLUSION

Arguments can be expected to continue over what part science plays in what we do (whether science is best seen as our total definition or as a cooperative tradition), but we in educational technology are grappling at this moment with whether, and how, to define ourselves as part of the design tradition, rather than as a branch of science or as a science-based art. If we opt not to do so in the long run, we run the risk that the limitations of a process-centric view, or “scientised design” (Cross, 2007, p. 119) will distort and stunt our efforts to progress as a field of practice and of study. As Dorst (2007) points out, when process models are created, other critical aspects of design (specifically the object of design, the designer, and the context of design) are “bracketed” out (p. 5), which means that expert designers do not use the methods or tools that scholars develop, and the research/practice gap widens. As that happens, it becomes difficult to grapple with large changes in the world which affect design, including those – like generative AI – that are already revising practice in the field.

As active members of the design tradition, however, we become part of a diverse community that shares a broad base of fundamental characteristics in spite of any differences in focus and outcomes between us. We can, therefore, benefit from studies of design and designing across multiple fields of design. We can enter conversations with those fields and offer to them in turn the real benefit of our own disciplined outlook, arguably a positive byproduct of identifying as a science, on the practice of design built up over recent decades. We can engage in discussions about the tools and processes we use without having to end those discussions by choosing just one of these as “the right one.” We can argue productively about theories of learning and instruction, and about philosophies of design, because we will not be confusing these either with our practice of designing or with our definitions of the field. We can study the individual outcomes of design without having to distort those studies with unsupportable claims for all designs in order to conform, badly, to the norms of scientific inquiry. We can use the principles we develop as what they are – tools for design – rather than as universal truths capable of generating designs all by themselves. And we can engage in legitimate scientific study of what we do, which will produce improvements in learning and performance far beyond those we are able to achieve today.

Summary of Key Principles

1. Instructional design is not a science and does not need to cast itself as a science in order to retain legitimacy. We can position ourselves within the design tradition and still draw upon scientific principles and processes as needed.
2. Process models have become so pervasive and influential in framing our understanding of instructional design thinking and work that they are sometimes seen as the embodiment of our design knowledge and all design ideas are framed within them.
3. Experts do not use the tools for design that scholars develop and teach in this field (process models and prescriptive theories), and when used as a primary vehicle for teaching such tools may actually defeat the development of design expertise.
4. Scholars in the field have adapted, and continue to adapt, ideas from both traditional and emerging fields of design, working to integrate them with existing ideas or to serve alternative philosophical values. No single perspective is emerging to replace reliance on process models as the core of designing within the field, which is appropriate and opens the field to a richer set of understandings than has been available previously.
5. Just because what we offer by virtue of our current design knowledge may be better than what people had before does not mean that what we are offering is good enough. To the extent that we lag in exploring and understanding the complex nature of design, other fields of practice will pick up the concerns we consider to be central to our own field and before long address them more effectively than we can do ourselves.

Application Questions

1. Your instructor for a graduate course on New Media in Ed Tech has taken you to visit a video game design house in a nearby city. During the visit your class focused on the instructional components that are built into the games being created there, and you noted that no one you spoke to mentioned terms you might have expected to hear – task analysis, instructional strategy, and so on. When you asked about the process they use, the answers seemed vague and the designers got impatient discussing process. It almost seemed as if they made up the process as they went along for each game they designed.

As a game player yourself, though, you know that the instruction in the games from this shop is really good; you have learned to play several of these games quickly compared to some others and you have admired the strategies that were used to incorporate tutorial elements into the game play.

What factors might contribute to these designers being able to create effective instruction without the use of an articulated process model for doing so, and how would those factors interrelate?
2. You work with a consulting group that develops instruction for small-to-medium corporate

clients. Recently you have been approached by a potential client who needs to revise existing training to be more responsive to her increasingly diverse workforce, ensure that trainees are team-building effectively as they prepare for work with the company, and that equitable outcomes are being realized across the incoming workforce. They have substantial funding and have encouraged you to start by exploring a way to help them address the social and cultural

issues involved, going beyond the standard “skills and knowledge” training that is in place now.

How might you structure your view of the design space this client is presenting and frame, or reframe, the problem as given to you? Which aspects of the client’s request would be most difficult to address using a traditional ISD view or process, and how might you need to adjust processes like analysis and evaluation in response to the assignment?

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Future Research Directions for Instructional Design and Technology

Lin Lin Lipsmeyer and Thomas C. Reeves

At the time of finalizing this chapter, in the second quarter of 2024, there are at least three proverbial elephants in the room with respect to the future of research in the field of instructional design and technology (IDT). The first elephant is the rapid rise of generative artificial intelligence (AI). The email inboxes and social media feeds of IDT professionals and practitioners are flooded with announcements of new conferences, books, seminars, courses, and other phenomena related to the possibilities and perils of generative AI programs such as ChatGPT in our field. The second elephant is the failure of one of the major products of the IDT field, online learning, during the worst months of the Covid-19 pandemic in 2020, resulting in a series of “learning loss” conversations. Disastrous learning losses resulted at every level of education when teachers and students were suddenly forced to teach and learn online, losses that will continue to compound for years (The White House, 2023). The third elephant is the emergence of competing competitors to instructional design (ID), including, for instance, learning engineering (LE) and learning experience design (LXD). Although ID graduate programs continue to dominate, more universities are developing competing graduate programs to prepare learning engineers and learning experience designers (Goodell et al., 2022; Jahnke et al., 2022).

We situate this chapter in the recent discussions of “failure of online learning” by briefly reviewing the history and research of online learning. We then look into the rapid development of (generative) AI technologies and evolving conversations about the probable impact of AI on IDT. Juxtaposing our own understanding of future research with the responses generated by ChatGPT, we look into the past, present, and more importantly, the future areas of research of IDT. We then discuss the emerging competitors of IDT as a way to highlight the fluid but overlapping research interests while documenting the complexities of our interdisciplinary area(s) of studies.

THE FAILURE OF ONLINE LEARNING DURING THE COVID-19 PANDEMIC

In the same year that the first edition of this book appeared (Reiser & Dempsey, 2002), the Massachusetts Institute of Technology (MIT) launched the OpenCourseWare Project, intended to provide free MIT courses to people around the globe. In the ensuing two decades, thousands of research studies were conducted to investigate and refine the power of online learning, many, perhaps most, conducted by IDT scholars. A considerable proportion of these studies were media comparison studies between online learning and classroom instruction. In 2009, the U.S. Department of Education released a meta-analysis of these types of studies, which concluded that, on average, students in online learning conditions performed modestly better than those receiving face-to-face instruction (Means et al., 2009).

Considering the enormous body of research on online teaching and learning, it seems reasonable to have expected that by 2020 online learning would have been ready to rise to the occasion when teachers and students at every level were suddenly forced into remote modes by the Covid-19 pandemic. The effectiveness of online teaching and learning remains debatable, but most scholars and practitioners agree that both teachers and students faced enormous challenges during the months when education was suddenly forced into remote modes (Cockerham et al., 2021). The reasons for the lack of success of online learning include:

- Not all students had equal access to the necessary technology or a conducive environment for learning at home. These factors often exacerbated pre-existing inequities.
- Studies of online learning during the pandemic have found that students, especially younger ones, did not learn as effectively in a remote environment as they did in person. This was especially true for subjects or skills that benefit from hands-on experiences.
- Teachers often reported that it was harder to keep students engaged in virtual classrooms.
- Both teachers and students were confronted with technical glitches, from internet connectivity issues to unfamiliarity with digital platforms.

As education transitioned from face-to-face to remote settings, many support services for accessibility issues were either unavailable, difficult to obtain, or reduced in capacity (Smith & Colton, 2020). In the process of responding to the pandemic, teachers, teacher educators, instructional designers, and researchers learned that social isolation and other consequences of Covid-19 negatively influenced the emotional and mental health of both teachers and students (Kalir et al., 2020). Although online teaching and learning during the pandemic was in most cases the only alternative, it encountered significant challenges. These challenges were often unmet, and as a result three years on, many students have dropped out of formal education, and those that remain are dealing with serious learning losses and even worrisome mental problems. With respect to the former, Shores and Steinberg (2022) estimated that it will cost 700 billion dollars to remedy pandemic learning losses in the U.S. alone. With respect to the latter, millions more dollars are being allocated from the Elementary and Secondary School Emergency Relief (ESSER) and the Higher

Education Emergency Relief (HEERF) funds for mental health care that U.S. students need because of the pandemic. In the process, schools and universities have improved infrastructure, teachers and students have upskilled, and everyone has been exposed to new practices (Howard & Tondeur, 2023).

What does this mean for IDT research? In an interdisciplinary project conducted across five continents, Guppy and a team of researchers from nine different higher education institutions (Guppy et al., 2022; Silvia et al., 2021) looked into what happened in different institutions during the pandemic and what were discussed as the future of digital learning after the pandemic. Using interviews and self-administered questionnaires from 281 university educators, 4243 students, 15 senior administrators, and 43 instructional design specialists, the researchers revealed a high degree of consensus between respondent groups, with most envisioning more blended/hybrid instruction post-pandemic and some modest increases in fully online courses. The researchers suggest that it is important to reflect and unpack these experiences, incorporate insights of instructors, students, and instructional designers, and thoughtfully integrate face-to-face learning, blended/hybrid learning, and educational technology. Some important insights, which are also documented by other researchers, include paying closer attention to *accessibility issues* (Smith & Colton, 2020), *digital equity issues* (Hall et al., 2020; Kalir et al., 2020), and *emotional and mental health issues* (Roman, 2020).

Since the start of the pandemic in 2020, there have been numerous publications on the impact of the pandemic on research, instructional design, teaching, and learning in higher education and K–12 settings in educational technology journals. For example, Educational Technology Research and Development (ETR&D) published two special issues addressing the challenges, opportunities, and competencies of shifting to digital during and after the pandemic (e.g., Howard & Tondeur, 2023; Lin & Johnson, 2021). Better understanding of digital competencies is indicated as necessary for engagement and agency. Research is needed to further understand how competency frameworks are implemented, if they are fit for purpose, and whether their validity and relevance are present in different contexts (Howard & Tondeur, 2023). *Digital literacies and competencies* will only become more important, particularly with the growing pressures to integrate AI in teaching and learning.

GENERATIVE AI AND FUTURE IDT RESEARCH

Although AI research and conversations have been around for a while, the sudden popularity of ChatGPT and other generative AI systems have stimulated excitement and anxiety among the public and all walks of life (Wilks, 2023). For researchers in education and instructional design and technologies, there have been positive predictions around efficiency, automation, innovation, scientific discoveries, human–machine collaboration, and personalized learning as well as anxieties around biases, fairness, ethical concerns, misinformation, security, and privacy.

In preparation for writing this chapter, we asked ChatGPT (paid subscription for Version 4.0) to answer the question “What kinds of research should educational technologists conduct in the future?” The response came in mere seconds.

Educational technologists will play an increasingly significant role in the evolution of learning environments and methodologies. Given the fast-paced growth of technology and its potential impact on education, here are several research areas that educational technologists should consider in the future:

- **Personalized Learning:** Investigate how technology can provide customized learning experiences for students based on their learning styles, backgrounds, and pace. This includes adaptive learning systems, AI-driven content recommendations, and data analytics.
- **Virtual and Augmented Reality:** Research the efficacy of VR and AR in creating immersive learning experiences, their role in developing practical skills, and their psychological and physiological impacts on learners.
- **Gamification and Game-Based Learning:** Examine the effectiveness of gamified learning platforms and serious games in enhancing motivation, engagement, and knowledge retention.
- **Neuroeducation:** Collaborate with neuroscientists to study how digital tools affect the brain's learning processes, cognition, and memory.
- **Socio-Cultural Impacts:** Research how educational technologies impact cultural and social dynamics in the classroom and wider school environment.
- **Equity and Accessibility:** Study the implications of technology on creating inclusive education. This includes accessibility for students with disabilities and the potential widening or narrowing of educational gaps based on socio-economic status.
- **Ethical Implications of EdTech:** Dive into issues related to data privacy, surveillance in education, and the ethical considerations of AI-driven decision-making in educational contexts.
- **Blended Learning:** Examine the effectiveness of combining traditional classroom teaching with online education and discover best practices for various educational contexts.
- **Collaborative Technologies:** Research how emerging technologies (like blockchain, for example) can support decentralized and collaborative learning environments.
- **Lifelong and Life-Wide Learning:** Explore technologies that support learning throughout a person's life, both in formal settings and in daily activities outside the classroom.
- **Professional Development:** Investigate how technology can be used for teacher training and continuous professional development, helping educators keep up with changing educational landscapes.
- **Mental Health and Well-Being:** With the rise of e-learning, there are both opportunities and challenges related to mental health. Research how technology can support student well-being as well as how it might exacerbate mental health issues.
- **Learning Analytics:** Dive deeper into the collection, analysis, and reporting of data about learners to optimize the learning process.

- **Sustainability:** Explore how edtech can be developed and implemented in ways that are environmentally responsible and sustainable.
- **Community and Parental Engagement:** Examine tools and platforms that bridge the communication gap between schools, parents, and the community, enhancing collaboration and mutual support.

Continued advancements in educational technology will undoubtedly lead to new areas of exploration. Researchers should be adaptive, interdisciplinary, and maintain an ethical lens to ensure that the integration of technology serves all learners' best interests.

One can get varied versions of this response, although they do not vary greatly with the same asked question. There is much to commend about this response. Although there is some emphasis on research on things such as Virtual and Augmented Reality and Learning Games, there is also a refreshing emphasis on problems such as Equity and Accessibility and Professional Development. In a previous collaboration (Reeves & Lin, 2020), we deplored the overemphasis in the IDT field of research on things such as digital games and virtual reality rather than on problems such as the underrepresentation of women and minorities in STEM fields or digital illiteracy. We are pleased to see generative AI including challenges such as Sustainability, Mental Health and Well-Being, and Community and Parental Engagement as the kinds of research needed to be conducted by educational technologists in the future.

As discussed previously, one of the most serious problems causing the "failure of online learning" during the Covid-19 pandemic is related to *equity and access* to technology and resources. As we advance into an increasingly digital and technology-driven era, it is imperative that we prioritize inclusivity and fairness. In addition, equity in instructional design and technology extends beyond access. Equity involves addressing bias and discrimination in algorithms, data, and design to prevent the continuation of systemic inequalities. Although researchers, educators, and policymakers have tried to reduce digital divides over the years, much more work is needed to ensure that new technologies are accessible to all, regardless of socioeconomic status, physical ability, or geographical location (Van De Werfhorst et al., 2022). For instructional designers and researchers, this means developing and researching solutions that accommodate diverse needs through user-friendly interfaces, assistive technologies, or affordable access options.

The issue of *mental health and well-being* was also heightened during the pandemic (Viner et al., 2022). Innovative pedagogical approaches and research are needed to foster resilience and equip students with crucial life skills for coping with stress and adversity. Social-emotional learning (SEL), mindfulness practices, and mental health education need to be integrated into the academic curricula. Research needs to look into the impact of technology on students' mental health, seeking to strike a balance between the benefits and challenges posed by digital learning tools and screen time. Often, technology

is changing the way we communicate, in which genuine and organic social interactions between human beings are being degraded through constant exposure to illusory exchanges with machines, technologies, social media, or AI (Turkle, 2011). With fingers on a mouse or keyboard rather than hands holding or shaking, children and learners are becoming more isolated, resulting in mental health and well-being problems. Collaborative research between educators, psychologists, and healthcare professionals will be essential in developing evidence-based interventions to address the mental health needs of students at different age levels and cultural contexts and create supportive, empathetic, and nurturing learning environments.

Personalized Learning

Personalized learning has potential to reshape the education landscape, although how and to what extent remains controversial (Watters, 2023). It has the potential to leverage advancements in AI and data analytics to tailor educational experiences to individual students, catering to their interests, strengths, challenges, and needs (Kem, 2022). By harnessing the power of new adaptive technologies, educators can foster greater student autonomy, motivation, and achievement while addressing the diverse needs of learners. Students of diverse backgrounds can benefit from customized curricula, real-time feedback, and differentiated content, enhancing engagement and comprehension. Current and future research can benefit from exploring innovative approaches, including adaptive algorithms, intelligent tutoring systems, and virtual learning environments, to create more engaging and effective learning experiences. As IDT researchers delve deeper into the potential of personalized learning, they can offer insights into ways to foster self-directed learning, critical thinking, and adaptability in addition to improving academic outcomes that will better prepare learners to meet the challenges inherent in our ever-evolving world.

In the past decades, online learning, blended learning, micro-credentials, and personalized learning pathways have been advocated and integrated to foster *lifelong learning* opportunities. Research investigating lifelong learning will continue to be important because of the rapidly changing job market and technological advancements. Central to this line of research is the understanding of the motivations and barriers that influence lifelong learners so as to tailor educational approaches to accommodate different age groups and life circumstances. Researchers need to explore innovative ways to enhance accessibility, affordability, and engagement in lifelong learning programs, and to improve the relevance of lifelong learning opportunities and their alignment with the evolving demands of the workforce. Such research will pave the way for a more inclusive, flexible, and effective lifelong learning ecosystem that empowers individuals to adapt and thrive in a rapidly changing world.

Last but not least, IDT research in *ethical AI* will play a significant role in shaping the responsible design, development, and integration of AI in learning environments (Nguyen et al., 2023). Research is needed to examine various facets of AI ethics in educational settings, including privacy, bias, transparency, accountability, and fairness, and to examine the ethical implications of AI-powered personalized learning, data privacy, and the potential impact on student well-being. As AI increasingly becomes integrated into the educational

landscape, research is needed to ensure the applications of AI technologies respect the rights and dignity of learners while promoting their educational development. Ethical AI research in education will be instrumental in shaping policies and practices that safeguard both the educational experience and its ethical principles.

CO-DESIGN LEARNING EXPERIENCES

Another major influence on the future of IDT research is the emergence of at least two new professional roles that will inevitably compete with traditional instructional designers, specifically learning engineers and learning experience designers. The roles of these three types of professionals overlap in that they all focus on the design and development of effective learning environments and experiences, although there are some differences among them.

Traditionally, instructional designers (IDs) are primarily concerned with the *instructional aspects* of a learning experience. Their overarching goal is to ensure that clear objectives are specified and that content is organized and presented in a manner that facilitates effective instruction. Most IDs have a background in education, but many have undergraduate degrees in fields as diverse as business, English, or social science. IDs draw upon learning theories and utilize instructional design models to guide their design decisions. IDs typically conduct needs assessments, define measurable learning objectives, structure content, select appropriate instructional strategies, and evaluate the effectiveness of the resultant instruction. IDs may also be involved in the actual creation of learning materials or work alongside others who do, such as graphic artists, videographers, and computer programmers.

Learning engineers (LEs) strive to *bridge the gap* between the learning sciences and advanced technology. LEs typically have a background in both cognitive science and technology or engineering. LEs may work on the development of learning platforms, tools, and software, ensuring that they are both technologically sound and pedagogically effective. LEs may work in teams with IDs to translate the instructional plans of the ID into a sophisticated technological reality.

Learning experience designers (LXDs) emphasize *the learner's* individual journey and experience. They take a holistic view of the learning process, considering not just the content and structure but also the emotional and experiential aspects of learning. LXDs come from a variety of backgrounds, including design, psychology, UX/UI, or education. LXDs seek to make learning engaging, motivating, and even memorable. They may incorporate multimedia elements, gamification, interactivity, and storytelling into crafting an engaging learning journey. While they consider instructional design principles, they also emphasize human-centered design and user experience principles to create powerful learning experiences.

Whether the distinctions between these three roles become more pronounced or merge in the future remains to be seen. Yet, this is a development that deserves more research. It is clear that researchers and educators are looking for novel approaches and solutions to address the new challenges and problems. To do so, we need to adapt, change, and collaborate with other

disciplines; IDs, LEs, LXDs, learning analysts, teachers, and others must increasingly work across disciplines and break down boundaries. In addition, we need to collaborate with learners and co-design the experiences with the learners! We need to partner with all the stakeholders – learners, teachers, parents, and families to tackle the education problems of the future.

Research in co-designing learning experiences represents a dynamic and learner-centric approach to educational innovation (Papageorgiou & Kokshagina, 2022). This approach acknowledges the significance of involving learners, educators, and stakeholders in the design and development of educational materials and strategies. Here researchers focus on understanding the diverse needs, preferences, and backgrounds of learners, and then leverage collaborative processes to create learning experiences that are engaging, relevant, and effective. Co-design research explores how technology and pedagogy can be harmoniously integrated, emphasizing the importance of inclusivity, accessibility, and co-creation in the development of educational content and tools. Ultimately, the goal of research is to empower learners and educators to actively participate in the educational process, fostering a more engaging and effective learning environment that adapts to the unique requirements of its participants. It potentially represents a transformative shift in education, as it harnesses the diverse expertise and perspectives of all involved, ensuring that the learning process is not only more engaging but also attuned to the evolving needs of the learners and the demands of today and tomorrow.

CONCLUSION

Much of IDT research has been focused on technologies and media. In this chapter we advocate for a sharper focus on problems so that future research in our field is more influential on practice. As stated by Bonk and Wiley (2020):

Perhaps the most frustrating thing about the field of learning technologies is the way it obsesses over technologies while devaluing or even ignoring problems faced by learners around the world. For decades, learning technologies . . . have been elevated to objects of study in and of themselves. All too frequently, those working in our field respond to questions about their research agenda with answers like “I study iPads,” “I study augmented reality,” or “I study open educational resources.” We question whether this fetishization of learning technologies will help us make sustained, meaningful improvements to the world in the future. As long as we are focused on the tools themselves, the ongoing march of learning technologies will resemble an endless series of waves eternally breaking on the shore only to draw out and come crashing in again without making a visible difference in the surrounding landscape. We encourage learning technologists to follow the old advice, ‘fall in love with the problem, not the solution.’ The world is full of so very many problems that desperately need solving – racism, poverty, crime, climate change, war, Internet access, educating refugees . . . the list goes on and on and ranges from the local to the global.

(Bonk & Wiley, 2020, pp. 1606–1607)

In fact, we made similar suggestions independently after reviewing a series of systematic review research on emerging learning environments and technologies. We suggested that researchers

focus on serious problems related to teaching, learning, and performance, collaborate closely with teachers, administrators, and other practitioners, and seek to make a difference in the lives of learners around the world. Instead of expecting the next “killer app” or technical innovation to transform education, perhaps we can better transform education by fostering incremental changes through collaborative research and development with practitioners

(Reeves & Lin, 2020, p. 1999)

If, in the future, IDT researchers focus on the issues raised in this chapter they will increasingly be front and center in the efforts to advance theory and development in the field of education and beyond.

Summary of Key Principles

1. **IDT research should begin with a clear focus on a real-world problem.** Real-world problems that could and should be addressed by IDT researchers include failure to engage online learners, poor learner motivation, inadequate preparation for real-world performance, underrepresentation of women and minorities in STEM careers, stymied intellectual curiosity, underdeveloped creativity, and insufficient time-on-task.
2. **The rapid rise of generative artificial intelligence (AI) provides exciting new affordances for IDT researchers, but also serious challenges.** At the time of writing this chapter, the pros and cons of generative AI such as ChatGPT are unclear. Regardless of the uncertainty surrounding AI, it behooves IDT researchers to learn how to
- use these tools wisely to further research addressing serious educational problems.
3. **The learning losses that resulted from the failure of online and blended learning during the Covid-19 pandemic are very likely to compound for years to come.** These learning losses as well as related problems such as dropout and mental depression constitute problems that IDT researchers should be encouraged to address.
4. **New professional roles such as learning engineers and learning experience designers are emerging as alternatives to traditional instructional designers.** IDT researchers should engage in research focused on the evolving nature of professional practice in the field.

Application Questions

1. Choose one of the specific research topics mentioned in the ChatGPT box presented earlier. Create a sketch of a research project to address the issue, including research question(s), theoretical

framework, literature review questions, and possible methodological approach(es).

2. Choose another one of the specific research topics mentioned in the ChatGPT box. Use Google Scholar or an AI program such as ChatGPT or Elicit (<https://elicit.com>)

to see what research has already been done to address the issue. Prepare an outline of a research proposal that could be submitted to NSF, the Department of Education, or a non-governmental foundation such as the Spencer Foundation.

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Epilogue

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In the Introduction, we suggested that by the time you finished reading this book, you might be able to provide your parents (or anyone else who is really interested) with a clear picture of the field of instructional design and technology. Now that you have completed the book, what do you think? Do you feel more confident at the dinner table in explaining what you do and why it is important? What is your view of the field? Has it changed by learning about these issues and trends?

Don't be afraid to answer the questions we just posed. As you must know by now, there are many different facets to the field, and there have been so many ways in which it has been defined, there is no one "right" answer to the question. IDT professionals, including those who wrote chapters for this book, hold a wide range of views about the nature of the field, and as far as we know, none have been designated as the "correct" one. Now that you have studied this book and, hopefully, learned a lot about the nature of our field, you should be well-prepared to join the debate. Of course, your views are likely to change over time, but we think that now is a good time to reflect on what you have learned and express your point of view to others.

So, go ahead. Call your folks and tell them what our field is all about. Perhaps they will finally understand exactly what it is that you are studying. But even if they don't understand what you are talking about, they will enjoy hearing from you!



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