TRENDS AND ISSUES IN INSTRUCTIONAL DESIGN AND TECHNOLOGY

Third Edition

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This book provides readers with a clear picture of the field of instructional design and technology. Many textbooks in the IDT field focus on the skills needed by instructional designers and technologists. 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, know and understand the field’s history and its current status, and describe the trends and issues that have affected it and will be likely to do so in the future. This book will help readers attain these goals.

Organization of the Book

Organized into nine sections, the first section of the book focuses on foundational issues—defining key terms in the field and presenting its history. The second section, addressing the theories and models of learning and instruction that serve as the basis for the field, discusses wide arrays of viewpoints ranging from cognitive and behavioral perspectives to some of the views of teaching and learning associated with constructivism and the learning sciences. Two of the often overlooked phases of the instructional design process, namely, evaluating and managing instructional programs and projects, receive attention in section three, with particular emphasis on current methods of evaluation, including return on investment, and on how to manage design teams and scarce resources. The fourth section of the book hones in on key ideas and practices associated with performance improvement. A variety of non-instructional solutions to performance problems, such as performance support, knowledge management, and informal learning, are described. The fifth section of the book describes what IDT professionals do in a variety of work settings, including business and industry, the military, health care, P–12 schools, and higher education. Global trends in instructional design and technology, section six of the book, offers insights about the instructional design practices and technologies employed in parts of Europe, Asia, and Africa. Section seven focuses on how to get an IDT position and succeed at it. In addition to offering suggestions to job seekers, the section describes some of the organizations and publications that will foster the growth of IDT professionals. The eighth section explores new directions in the field, including the impact of recent trends such as social networking, virtual worlds, and game-based learning. The last section of the book addresses some of the current issues in the field of instructional design and technology. Topics such as diversity, accessibility, professional ethics, and the benefits of different levels of instructional guidance are among the current-day issues addressed.
What's New in This Edition?

The third edition of this book differs significantly from the second edition. One major difference is the inclusion of 18 new chapters in this edition. Many of these chapters provide an in-depth look at topics that were either not covered, or briefly touched upon, in the second edition. These thoroughly new chapters focus on:

- Constructivism (Chapter 5)
- The Learning Sciences (Chapter 6)
- Designing for Problem Solving (Chapter 7)
- Instructional Theory for a Postindustrial World (Chapter 8)
- Return on Investment (Chapter 11)
- Performance Support (Chapter 15)
- Instructional Design in P–12 Education (Chapter 21)
- Instructional Design in the Developing World (Chapter 23)
- Instructional Design in Asia (Chapter 24)
- Instructional Design in Europe (Chapter 25)
- Reusability and Reusable Design (Chapter 30)
- Web 2.0 and Social Networking (Chapter 31)
- Game-Based Learning (Chapter 33)
- Virtual Worlds (Chapter 34)
- Professional Ethics (Chapter 35)
- Diversity and Accessibility (Chapter 36)
- The Changing Nature of Design (Chapter 37)
- The Benefits of Different Levels of Instructional Guidance: A Debate (Chapter 38)

In addition to these new chapters, many of the other chapters have been extensively revised. These chapters include:

- Characteristics of Instructional Design Models (Chapter 2). This chapter now includes an entirely new major section devoted to whole task approaches to the instructional design process.
- A History of Instructional Design and Technology (Chapter 3). New sections discuss recent increases in the use of digital media and informal learning in a wide variety of instructional settings, and the impact of these events on instructional design practices.
- Motivation, Volition, and Performance (Chapter 9). An extensive discussion of volition has been added to this chapter.
- Evaluation in Instructional Design (Chapter 10). Descriptions of several evaluation models that were not previously discussed (i.e., Brinkerhoff, Patton, and Rossi) have been added to this chapter.
- Informal Learning (Chapter 17). This chapter now contains an extensive discussion of how reliance on informal learning has increased as a result of the expanding use of Web 2.0 and social networking tools.
- Five University Roles for Designers from Three Nations (Chapter 22) now includes an author from Japan, who describes the Japanese experience, as well as authors from Australia and the United States.
- Professional Organizations and Publications in Instructional Design and Technology (Chapter 28) has been revised and updated and includes twenty professional organizations and fifty publications of interest to members of the IDT community.
- E-Learning and Instructional Design (Chapter 29) explores the primary drivers of e-learning such as convergence, virtual social learning communities, and personal technologies.
Also new to this edition of the book are end-of-chapter summaries of the key principles discussed in each chapter. 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 of the book should also be mentioned. While a few questions of this type appeared in the previous editions, in this edition the majority of application 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.

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Acknowledgments

This book would not have been possible if it were not for 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 provides readers with what we consider an insightful overview of the field of instructional design and technology, and the trends and issues that are affecting it. We would like to express our deepest thanks and sincere appreciation to all of 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.

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Many of us who have been in this field 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 always the same. Our parents go cross-eyed and mumble something like, “That’s nice, dear.”

How about your parents? How much do they know about the field you are now studying, the field this book is about? They probably can’t describe it very well; perhaps they can’t even name it. But that puts them in some pretty good company. Many professionals in this field 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 nature of the field that practitioners call by so many names? 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 almost sixty 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 two courses, there were greater similarities. (Dempsey was, after all, a student in Reiser’s Trends & Issues course shortly after movable type was invented.) So, it was natural that we spoke together on several occasions about the kind of text we would like to have, if we had our druthers.

When the folks at Pearson Education encouraged us in our delusions, our first idea was to produce a book of reprints from germane periodicals. As our discussions continued, however, we decided to invite a number of the most talented individuals we know in the field to contribute original manuscripts. 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 with 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 instructional design and technology, 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 who will take the time to listen.
What are the boundaries of the field we are in? How shall we define it? Indeed, what shall we call it? These are important questions that professionals in our field should be able to answer or, because there is no generally accepted “correct” answer, at least be able to discuss intelligently. This chapter is intended to provide you with information that should help you formulate some tentative answers to these questions. The chapter will examine how the definition of the field has changed over the years, present two 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 the years, a variety of different labels have been used, including, among others, such terms as audiovisual instruction, audiovisual communications, and educational technology. However, the term that has been used most frequently has been instructional technology. This is the term that 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, 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, 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, many attempts have been made 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 the 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 of 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 fifty 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 with media, they discussed it as being a process. For example, Finn (1960) indicated 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 the 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 Audiovisual Instruction (now known as the Association for Educational Communications and Technology), 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 U.S. government to examine the potential benefits and problems associated with increased use of instructional technology in schools. The Commission’s report, entitled To Improve Learning (Commission on Instructional Technology, 1970), provided two definitions of instructional technology. The first definition reflected the older view of instructional technology, stating:

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, stating:

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 seems to reinforce old notions about the field of instructional technology, its second definition definitely defines 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 nonhuman and human resources for instructional purposes, seemingly downplaying the role of media.

The 1977 Definition

In 1977, the Association for Educational Communication and Technology (AECT) adopted a new definition of the field. This definition differed from the previous definitions in several ways. Perhaps most noteworthy was its length—it consisted of sixteen statements spread over seven pages of text, followed by nine 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 sixteen 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 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 use of these terms, especially in the context of performance improvement.

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.

The 1994 Definition: Beyond Viewing Instructional Technology as a Process

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 of the field had been published. Thus, it was time to redefine the field.

Work on a new definition of the field 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 interrelationship between these domains is visually represented by a wheel-like visual, with each domain on the perimeter and connected to a “theory and practice” hub. This representation scheme was designed, in part, to prevent readers from coming to 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 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 definition statements appear also discuss theory and practice, but the definition 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.

Two Recent Definitions

In the past few years, several definitions have been published. In this section of the chapter, we will focus on two of these—one that an AECT committee has recently produced and one that we, the authors of this textbook, have developed.

The Latest AECT Definition

In 2008, an AECT committee produced a book that presented a new definition of the field of educational technology (AECT Definition and Terminology Committee, 2008). 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 chapters are described below.

One key term in the new definition is the word ethical. This term focuses attention on the fact that those in the profession 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, 2007).

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" (AECT Definition and Terminology Committee, 2008, 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 Definition Used in This Textbook

One of the many strengths of the new AECT definition of educational technology is that the definition clearly indicates that a focus on systematic processes and the use of technological resources are both integral parts of the field. The definition that we will use in this textbook emphasizes these two aspects of the field as well as the recent influence the human performance technology movement has had on the profession.

As will be pointed out in later chapters in this textbook (e.g., Chapter 14), in recent years many professionals in the field of instructional design and technology (ID&T), particularly those who have been primarily trained to design instruction, have been focusing their efforts on improving human performance in the workplace. Although such improvements may be brought about by employing instructional interventions, careful analysis of the nature of performance problems often leads to non-instructional solutions, such as instituting new reward structures, providing clearer feedback to workers, developing performance support tools (see Chapter 15), creating knowledge management systems (see Chapter 16), and/or promoting and enhancing opportunities for informal learning (see Chapter 17). This new emphasis on improving performance in the workplace via non-instructional as well as instructional methods has been dubbed the human performance technology, or performance improvement, movement. We believe that any definition of the field of instructional design and technology should reflect this emphasis. The definition that we have developed, and that we will use in this book, clearly does so. The definition is as follows:

The field of instructional design and technology (also known as instructional 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 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.

As noted earlier, this definition highlights two sets of practices that have, over the years, formed the core of the field. We believe that these two practices—the use of media for instructional purposes and the use of systematic instructional design procedures (often simply called instructional design)—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. More importantly, we feel the proposed definition, unlike those that have preceded it, clearly points to the efforts that many professionals in the field are placing on improving human performance in the workplace through a variety of instructional and non-instructional means. There is no doubt that many of the concepts and practices associated with performance improvement have been integrated into the training that future ID&T professionals receive (Fox & Klein, 2003), and the activities those individuals undertake once they enter the profession (Van Tiem, 2004). The definition we have put forward clearly reflects this reality.

Naming the Field: Why Should We Call It Instructional Design and Technology?

The definition proposed in this chapter also differs from most of the previous definitions in that it refers to the field as instructional design and technology, rather than instructional technology. Why? Most individuals outside of our profession, as well as many inside of it, when asked to define the term instructional technology, will mention computers, DVDs, 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 term instructional technology with the term
SECTION I  Defining the Field

instructional media. This is the case in spite of all the broadened definitions of instructional technology that have appeared over the past thirty to forty years. In light of this fact, perhaps it is time to reconsider the label we use for the broad field that encompasses the areas of instructional media, instructional design, and more recently, performance improvement. Any of a number of terms comes 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 on in earlier definitions. Performance improvement, the most recent area 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.

In this book, our field will be referred to as instructional design and technology, and we will define this term as indicated above. 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. 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 and educational 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 make mention of those new 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 that 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 use 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 in the workplace.

Application Questions

1. Define the field: Reexamine 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 either 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.

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, 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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References


Chapter 2
Characteristics of Instructional Design Models

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Instructional design (ID) is a system of procedures for developing education and training curricula in a consistent and reliable fashion. A system is an integrated set of elements that interact with each other (Banathy, 1987). Although the exact origins of the instructional design process can be debated, Silvern (1965) presented an early attempt to apply general systems theory (GST) as an approach to accomplishing learning tasks and solving instructional problems. Silvern's model, and practically all other early ID models, was based in behaviorism. Although behaviorism is commonly associated with B. F. Skinner and stimulus-response theory, many early behaviorists held far more encompassing theoretical and philosophical perspectives. Burton, Moore, and Magliaro (1996) broadly defined behaviorism as the philosophy and values associated with the measurement and study of human behavior. Cognitive psychologists, particularly from the perspective of information processing, such as Gagné (1985), have also made major contributions to the underlying theories of instructional design.

Soon after behaviorism was acknowledged 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 merely means agreeing to adopt rules and procedures as a way to move through a process. However, being systematic does not mean blindly 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 components of a system 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. Redundancy refers to duplicate processes and duplicate procedures that are intended to prevent 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 the purpose to steer, govern, and guide. Cybernetics is most often associated with theories related to automated control systems. Synergistic means that together, all the elements can achieve more 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.

The nine characteristics just described enable a systems approach to facilitate the complexities of an educational situation by responding to multiple components that form the
system, the interactions within a system, and the interactions that occur between different systems. Different learning outcomes often require various applications to a general systems concept. As a result, systems theory has been used as the basis for the development of a wide variety of instructional design models. The next section of this chapter describes several such ID models.

"Traditional" Instructional Design Models

One of the most popular and influential ID models was created by Dick, Carey, and Carey (2005) and is depicted in Figure 2.1. While instructional design has traditionally been portrayed as rectilinear rows of boxes connected by straight lines with one-way arrows and a return line that is parallel to other straight lines, similar to the model as depicted in Figure 2.1, it is worth noting here that the actual practice of instructional design might be better communicated as a curvilinear flow diagram. Curvilinear compositions of ovals connected by curved lines with two-way arrows effectively acknowledge the complex reality upon which instructional design is practiced. Curvilinear portrayals of ID models tend to communicate more iterations, which characterize the actual way instructional design is typically practiced (Branch, 1996). Figure 2.2 illustrates another example of an ID model based on the systems approach to instructional design that employs some curvilinear elements.

While there are a variety of ID models that have been generated since the 1970s (Gustafson & Branch, 2002), practically all ID models contain the core elements of ADDIE (Figure 2.3). ADDIE is an acronym for analyze, design, develop, implement, and evaluate. ADDIE is based on a systematic product development concept. The concept of systematic product development has existed since the formation of social communities. 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 that share a common underlying structure. According to Molenda (2008), the ADDIE label seems to have evolved informally through oral tradition, rather than having been formalized as a term by a single author. Molenda further asserts that ADDIE has become a colloquial term used to describe a systematic approach to instructional design.

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, Carey, & Carey, 2005; Smith & Ragan, 1999), classifying learning as to type (Gagné, et al. 2005; Merrill, 1983), specifying learning activities (Briggs, Gustafson & Tillman, 1991), and specifying media (Reiser & Gagné, 1983; Smaldino, Lowther, & Russell, 2007). Development includes preparing student and instructor materials (both print and nonprint) as specified during design (Morrison, Ross, & Kemp, 2004). Implementation includes delivering the instruction in the settings for which it was designed (Greer, 1996). Evaluation includes both formative and summative evaluation, as well as revision (Dick, Carey, & Carey, 2005). 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.

It is important to note that the ADDIE activities typically are not completed in a linear step-by-step manner, even though for convenience they may be presented that way by


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Characteristics of Instructional Design

Although the ADDIE activities mentioned earlier represent the fundamental concepts of the instructional design process, there are several characteristics that should be present in all instructional design efforts.

1. Instructional design is student centered.
2. Instructional design is goal oriented.
3. Instructional design focuses on meaningful performance.

various authors. For example, during the life of a project, as data are collected and the development team gains insights, it is often necessary to move back and forth among the activities of analysis, design, and formative evaluation and revision. Thus, the iterative and self-correcting nature of the instructional design process emerges as one of its greatest strengths. Therefore, ID models should assure opportunities for recurring and concurrent design activities from the beginning to the end of the instructional design process.
4. Instructional design assumes outcomes can be measured in a reliable and valid way.
5. Instructional design is empirical, iterative, and self-correcting.
6. Instructional design typically is a team effort.

**Instructional Design Is Student Centered**

Student-centered instruction means that learners and their performance are the focal points of all teaching and learning activities. Teaching and other forms of instruction are simply means to the end of learner performance. Thus, there may be no initial assumption that a live teacher is even needed for the learner to achieve the stated objectives. Self 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. Learners may also be given opportunities to select their own objectives and/or learning methods 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 Goal Oriented**

Establishing well-defined project goals is central to the ID process. Goals should reflect client expectations for the project and, if met, ensure its appropriate implementation. Unfortunately, many well-intended projects fail from lack of agreement on the goals or the decision to put off this important step in the false belief that this can be settled later. Identifying and managing client expectations are of particular importance to the project manager, but team members also need to share a common vision of the anticipated outcomes of the project. The ultimate question for an instructional system is, "Have the goals of the project been attained?"

**Instructional Design Focuses on Meaningful Performance**

Rather than requiring learners to simply recall information or apply rules on a contrived task, instructional design focuses on preparing learners to perform meaningful and perhaps complex behaviors including solving of authentic problems. Learner objectives are stated so as to reflect the environment in which students will be expected to apply the acquired knowledge or skill. Thus, there should be a high degree of congruence between the learning environment and the setting in which the actual behaviors are performed. While it is usually easier to identify performance settings for training programs (e.g., operating a drill press) than for school-based learning (e.g., a college biology course), instructional designers should strive to identify authentic performance measures for both settings.

**Instructional Design Assumes Outcomes Can be Measured in a Reliable and Valid Way**

Related to the issue of performance is creating valid and reliable assessment instruments. For example, if the objective is to safely and efficiently operate a drill press, then a valid (authentic) assessment technique would likely involve having an observer with a checklist observe the learner performing selected drilling operations and also examining the quality of the products created. In contrast, a multiple-choice, paper-and-pencil test would not be a valid measure. In schools, the issue of validity often is more complex, but nonetheless the instructional designer can still ask how the knowledge and skill might be applied or otherwise used to enhance the validity of the assessment. Reliability concerns the consistency of the assessment across time and individuals. Obviously, if the assessment is not stable, its validity is seriously compromised.

**Instructional Design Is Empirical, Iterative, and Self-correcting**

Data are at the heart of the ID process. Data collection begins during the initial analysis and continues through implementation. For example, during the analysis phase, data may be collected so as to compare what learners already know to what they need to know. Guidance and feedback from subject matter experts ensures the accuracy and relevance of the skills and knowledge to be taught. Results of research and prior experience guide the selection of instructional strategies and media. Data collected during formative tryout identifies needed revisions, and data from the field after implementation indicates whether the instruction is effective. 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 ID process usually is not as linear and sequential as most ID models imply.

**Instructional Design Typically Is a Team Effort**

Although it is possible for a single individual to complete an ID project, usually it is a team effort. Due to their size, scope, and technical complexity, most ID projects require the specialized skills of a variety of individuals. At a minimum, a team will typically 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
Whole Task Approaches to Instructional Design

Within the past decade, "traditional" instructional design models, particularly models such as the ADDIE model of instructional design, have come under attack (e.g., Gordon & Zemke, 2000, van Merriënboer, 2007), generating considerable debate about whether this type of approach is an effective and efficient way to design instruction, especially when the instruction is intended to teach learners how to perform complex skills. A key criticism has been that traditional ID approaches emphasize breaking complex skills down into their component parts, and designing instruction that initially focuses on teaching those component skills. It has been argued that doing so leads to fragmented instruction and is likely to result in learners having difficulty integrating the various part-skills that are they learning; in other words, inhibiting learner ability to perform complex skills (e.g., de Croock, Paas, Schlanbusch, & van Merriënboer, 2002; van Merriënboer, 1997; 2007).

In response to this criticism, several "whole task" models of instructional design have been proposed. In general, these models prescribe that throughout a sequence of instruction, learners should be presented with a series of progressively more difficult whole task problems of the type that the learners will be expected to solve by the end of that instructional sequence. A key idea is that such task sequences are more likely to enable learners to successfully perform the complex whole task. The next two sections of this chapter briefly describe two whole task ID models.

The Pebble-in-the-Pond Approach

In an attempt to overcome some of the aforementioned problems, and as an extension of his work on first principles of instruction, Merrill (2002a, 2002b) proposed the pebble-in-the-pond instructional design model, an approach to instructional design built around a progression of whole problems or tasks (see Figure 2.4). This model is not a substitute for ID but rather a content-centered modification of more traditional ID that facilitates incorporating first principles into an instructional product.

Traditional ID advocates the early specification of instructional objectives. The problem with this traditional approach is that instructional objectives are abstract representations of the knowledge to be taught, rather than the knowledge itself. Often the specification of the actual content is delayed until the development phase of the ID process. Many designers have experienced the difficulty of writing meaningful objectives early in the design process. Often, after the development starts, the objectives written early in the process are abandoned or revised to more closely correspond with the content that is finally produced.

Pebble-in-the-pond avoids this problem by starting with the content to be taught (the whole tasks to be completed) rather than some abstract representation of this content (objectives). Pebble-in-the-Pond assumes that the designer has already identified an instructional goal (not detailed objectives) and a learner population. The first step, the pebble, is to specify a typical problem that represents the whole task that the student will be able to do following the instruction. The word specify indicates that the complete problem or task should be identified, not just some information about the problem or task. A whole task includes the information that the learner is given and the transformation of this information that will result when the problem is solved or the task completed. The third component is to work the problem; that is, to indicate in detail every step required to solve the problem or complete the task.

Figure 2.4 indicates that the pebble-in-the-pond design model consists of a series of expanding activities initiated by first casting in a pebble, a whole task or problem of the type that learners will be taught to accomplish by the instruction. Having identified an initial problem the second ripple in the design pond is to identify a progression of such problems of increasing difficulty or complexity, such that if learners are able to do all of the whole tasks thus identified, they will have mastered the knowledge and skill to be taught. The third ripple in the design pond is to identify the component knowledge and skill required to complete each task or solve each problem in the progression. The fourth ripple is to determine the instructional strategy that will be used to engage learners in the problems and help them acquire the component knowledge and skill required to complete the tasks or solve the problems. The
Learners are able to complete a new task without further instruction.

Task-Centered Instructional Strategy

1. Show a new whole task.
2. Present topic components specific to the task.
3. Demonstrate the topic components for the task.
4. Show another new whole task.
5. Have learners apply previously learned topic components to the task.
6. Present additional topic components specific to this task.
7. Demonstrate the application of these additional topic components.
8. Repeat apply, present, demonstrate cycle (steps 4 – 7) for subsequent tasks.

FIGURE 2.5 A task-centered instructional strategy.
(Van Merrienboer & Kirschner, 2007) in their Ten Steps to Complex Learning approach to instructional design. As with the pebble-in-the-pond approach, van Merrienboer and Kirschner suggest that designers using the ten-steps approach should begin by specifying a series of learning tasks that are typical of the complex skill that the learner will be expected to perform following the instruction. These tasks should be of increasing difficulty so that during instruction the learner will begin by performing a simple version of the whole skill and will gradually move on to performing more complex versions.

The ten-steps approach, like the pebble-in-the-pond approach, also calls on designers to identify the subordinate knowledge, skills, and attitudes necessary to perform each learning task. The authors describe a series of design strategies and instructional techniques that designers can employ to help learners acquire these subordinate skills as well as successfully master performance of the complex whole skill. In many cases, these suggestions go beyond those provided by the pebble-in-the-pond approach.

Although the level of design guidance offered by the two aforementioned approaches differs, what is most important is what they have in common, namely, that they are whole-task approaches to instructional design. In other words, they prescribe that from the very early stages in an instructional sequence, learners should be engaged in performing simplified versions of the complex whole task they are expected to learn, with the level of complexity increasing as learners become more proficient at performing the necessary subordinate skills. The authors of these approaches argue this approach is more effective than some of the more traditional approaches to instructional design in which the initial focus is on having learners acquire a series of subordinate skills that the learner is not required to put together to perform the complex whole task until the end of the instructional sequence.

**Conclusion**

During the past few years, there have been many advances in learning theory, the technology of development, learning management systems, and the level of sophistication among the cadre of certified instructional designers. The whole-task models described in the preceding sections respond to authentic problems or tasks by increasing the effectiveness, efficiency, and engagement of the learning experience within contemporary teaching and learning situations. The pebble-in-the-pond model and the ten-steps approach facilitate the implementation of first principles of instruction and the 4C/ID model by specifying the content to be learned at the beginning of the ID process and then building a strategy around solving a progression of problems or doing a progression of increasingly complex tasks. However, the unifying variables contained in most of the original ID models remain the same. These unifying variables are that instructional design is a systematic process, usually conducted by a team of professionals. Additionally, instructional design is an empirical process that is student centered and goals oriented, geared toward helping learner acquire meaningful skills and knowledge that can be measured in a reliable and valid manner.

**Summary of Key Principles**

1. The instructional design (ID) process consists of a set of procedures for systematically developing education and training materials. Most of the “traditional” models (i.e., versions) of the ID process include five phases of activities: analysis, design, development, implementation, and evaluation, often referred to by the acronym ADDIE.

2. Although some descriptions may seem to portray the ID process as a linear one, instructional design procedures are rarely conducted in a linear fashion. It would be more appropriate to characterize the instructional design process as iterative; as instructional designers conduct their work, they often move back and forth among the various phases of the ID process.

3. The ID process often centers around designing instruction that will enable learners to attain well-defined goals that usually involve the learners being able to perform meaningful, and often complex, behaviors. An important part of the process involves accurately assessing whether learners can perform those behaviors. The data that is gathered via these assessments is often used by instructional designers and other members of an instructional design team to help them improve the quality of the instruction they are producing.

4. A key criticism of traditional instructional design approaches has been that by breaking complex skills down into their component parts, and designing instruction that initially focuses on teaching those component skills, such approaches result in learners
having difficulty integrating the various part-skills that they are learning; in other words, inhibiting learner ability to perform complex skills.

5. In contrast to traditional instructional design approaches, whole-task approaches (such as the pebble-in-the-pond approach and the ten-steps to complex learning approach) prescribe that

throughout a sequence of instruction, learners should be presented with a series of progressively more difficult whole task problems of the type that the learners will be expected to solve by the end of that instructional sequence. Such task sequences are more likely to enable learners to successfully perform the complex whole task.

Application Questions

1. You have recently been hired by a large plumbing company 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 six characteristics of instructional design that were described in this chapter to help you design an effective course.

2. Do you think that whole-task approaches are an improvement over “traditional” instructional design models? Explain why or why not.

3. Select a content area and try to specify a whole problem or task including both a demonstration and application. What were the challenges? Did you find designing a whole task helpful in identifying the instruction needed to help learners acquire the skills necessary to do this task or solve this problem? Why? Why not?

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