CHAPTER 1

Introduction to the Instructional Design Process

GETTING STARTED

At last, you have finished your degree and are now ready to start practicing instructional design at your new job with a Fortune 25 company. Your first day on the job, however, holds a few surprises. Of most concern is that the manager you thought you were going to work for has transferred to a different division. Your new manager does not have a background in instructional design, but rather has worked as a chemical engineer and project manager for this corporation for the past 15 years. Needless to say, you are a little apprehensive about your predicament, considering that you are the *first* instructional designer hired by this corporation. Shortly after the morning coffee break, your manager invites her staff in for an introductory meeting. The staff includes three trainers who have more than 35 years' combined experience in teaching courses for the corporation, an administrative assistant who schedules and makes arrangements for courses, two engineers who write new curricula and deliver courses (each of whom has worked in the department for 4 years), and you. The meeting starts with each individual describing his or her background and role in the department. The other staff members can easily impress the new manager with their mastery of company lingo and the number of hours of training they deliver each quarter.

Turning slowly, the manager sizes you up and asks you to describe your background and your role in *her* new department. The manager and other staff members are not impressed by your degree in instructional design or the fact that you received it from a leading program in the area—probably because they have never heard of instructional design (although one of the engineers was familiar with your university's field hockey team). After a brief pause and a few frowns, one of the senior trainers asks you to explain exactly what it is that you do—it's as if they all think you are an *interior* designer, there to spruce up their offices and classrooms.

The next few minutes are critical. You can either win over this manager and staff to a new way of viewing training, or you can overwhelm them with your knowledge so they decide you are one of those intellectual types. What will you say to this group that will help ensure your longevity with the company?

QUESTIONS TO CONSIDER

"Why examine the teaching/learning process?"

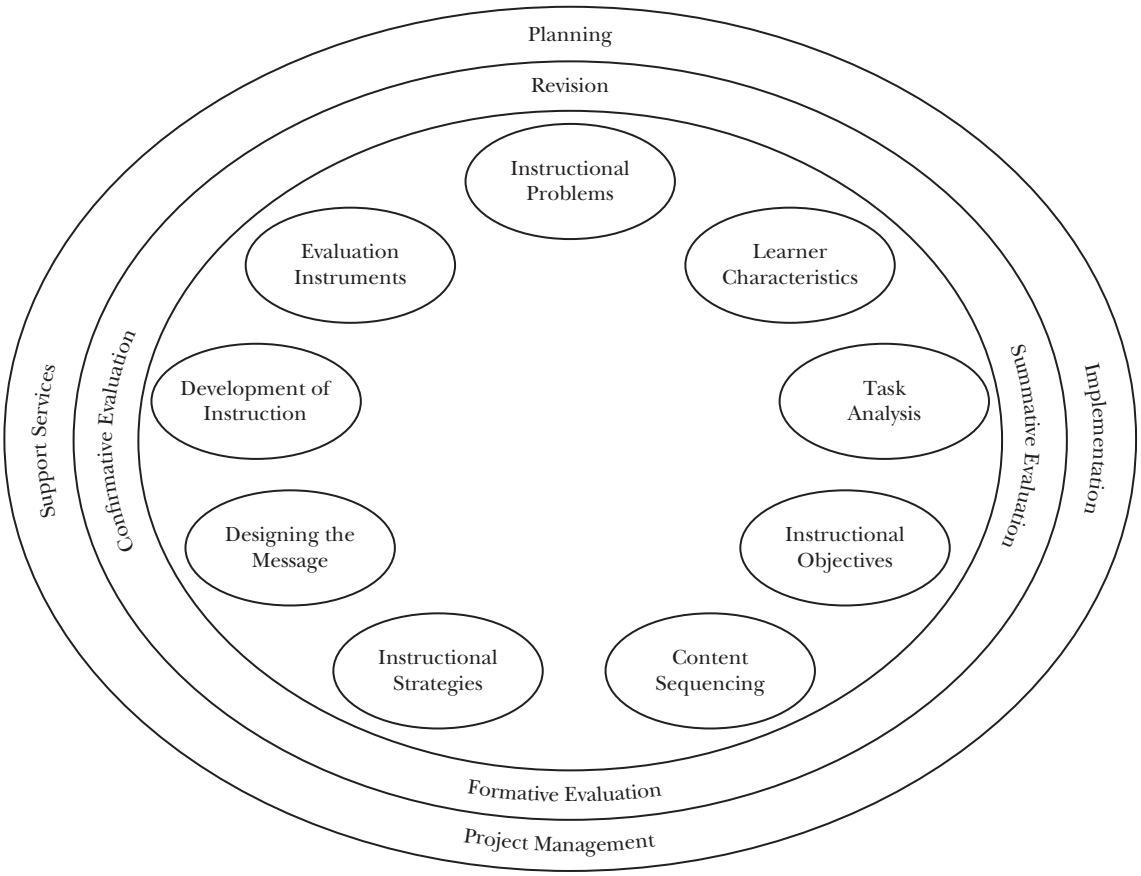
"What are the components of a comprehensive instructional design plan?"

"What premises underlie the instructional design process?"

"What benefits can result from applying the instructional design process?"

"What is the value of instructional design to teachers?"

"What is the relationship between instructional design and human performance technology?"



The Questions to Consider represent the important concepts treated in this introductory chapter. Understanding them is the basis for systematic instructional design.

WHY INSTRUCTIONAL DESIGN?

The goal of instructional design is to make learning more efficient, more effective, and less difficult. Often, well-designed instruction saves time and money. One of the best-documented cases of the value of instructional design is a case study conducted at AT&T in the 1960s and 1970s. AT&T offered a course for long lines craftsmen (Mager, 1977) that was 45 days in length, that is, 9 weeks of classroom time away from the job. To the dismay of local managers, individuals taking this training were unavailable to repair telephone lines for over 2 months.

In an effort to improve the training, an instructional design team conducted a task analysis to determine the essential content for the course. The results of this analysis revealed that 25 days of the course focused on irrelevant content. Additional instructional design techniques were applied to reduce the course duration from 9 weeks to 9 days, an 80% reduction in training time. The cost of developing this new course in the 1960s was $350,000 but resulted in savings of $37 million over a 5-year period between 1968 and 1973.

Why instructional design? We do not mean to imply that each instructional design project will yield the same return as described by AT&T's example. Of more relevance is the fundamental difference between the initial course and the revised course. The instructional designers focused on improving human performance to solve an instructional problem. By narrowing the content to the information and skills needed to perform the tasks or job, they were able to reduce the instructional time from 45 days to just 9 days. Sometimes, as we have found in our work, there is not a cost savings but rather a significant improvement in course quality as a result of the improved focus as described in the AT&T example.

A subject-matter expert or instructor often approaches the design of a course from a content perspective, that is, what to cover in the time allocated. In contrast, an instructional designer approaches the task by first defining the problem and then determining what knowledge and skills are needed to solve the instructional problem. This difference between a subject-matter expert's approach of determining what to cover and the instructional designer's approach of first defining the problem and identifying an instructional need offers insight into the course revision and subsequent cost savings in the AT&T example. The instructional design process focuses on what the learner "needs to know" and avoids including nonessential content that is "nice to know." There are times when the problem is not one that is best solved through an instructional intervention. A competent instructional designer can identify a variety of problems and then determine the most effective solution even when it means other individuals are needed for the solution.

Why Do Instructional Design?

Training is expensive, yet it is essential to the healthy functioning of any organization. In 2017, *Training Magazine's* Industry Report found that typical companies provided employees with 47.6 hr of training a year, an increase of 4 hr over reported times in 2016. In addition, the cost of providing training increased from $814 per learner in 2016 to $1,075 in 2017 (Training Magazine, 2017). Of importance to us as instructional designers is the cost per learning hour produced, which averaged $1,415. If we consider the training investment of a single company, the costs in time and expense are overwhelming. For example, IBM estimated it would spend approximately $700 million on training its

workforce in 2005, with employees spending more than 15 million hours engaged in training (Davenport, 2005). The costs for employee training in business in the United States grew from approximately $63 billion in 1999 to over $$117.5 billion in 2007 (ASTD, 2011). This increasing cost signals the importance of designing efficient and effective training.

Given that the cost of training includes not only development costs but also the time participants are away from their jobs, it is important that the instruction is effective, efficient, and on target. Thus, the goal for the instructional designer is to design and develop instruction that will improve performance in the most effective and efficient manner. Instructional designers want to avoid developing a course similar to the original AT&T linesman course, one that had irrelevant content and required workers to spend extra hours (actually weeks) away from the job. Given the more than 30 years since the publication of the AT&T case study, it is surprising that we continue to hear about and observe similar mistakes being made today.

What Are the Benefits of Instructional Design?

Given that the investment needed to develop training is quite substantial, what are the benefits of using an instructional design approach to develop the training?

First, let's consider the financial benefit of instructional design. The AT&T case study reported a savings of $37,800,000 over a period of 5 years based on an initial investment of $350,000, or a savings of $108 for each development dollar spent (Mager, 1977). In another example, Motorola reported a return of $33 for every dollar spent on training (Wiggenhorn, 1990). This calculated return rate also included the wages of the participants who attended the training.

Second, let us consider how you as an instructional designer can improve the return on the investment in training, whether it is for a Fortune 500 company or your classroom of third-grade students. Instructional design is a process for solving skills and knowledge deficiencies, whether it be troubleshooting an aircraft engine or learning the 50 U.S. states and their capitals. The process starts by identifying the performance problem of the worker or student and then determines whether instruction is the appropriate solution. If instruction is required, the designer then uses a systematic process to design the instruction. The process described in this book is similar in many ways to the one used in the AT&T course, which can be contrasted to the "What content should we include?" approach used for the original linesman course. In contrast, a systematic instructional design process asks, "What information and skills are needed to perform the task?"

Third, effective instructional design results in greater learning gains than training that is poorly designed. A meta-analysis of design features found an effect size of 0.62 for instruction that was properly designed (Arthur, Bennet, Edens, & Bell, 2003), suggesting a medium to large effect size. Another meta-analysis of error management training also found a positive and significant effect size for training (Keith & Frese, 2008). Last, a meta-analysis of team training in healthcare reported significant effect sizes for team training over no training (Hughes et al., 2016). An effect size indicates the number of standard deviations by which the intervention (treatment) group surpasses the comparison (control) group in performance. In educational research, effect sizes above .50 (one-half standard deviation) are considered to be highly impactful. For example, an effect size of +1.00 (a full standard deviation) would place the average intervention group student at approximately the 84th percentile of the comparison group. Aguinis and Kraiger (2009) found similar supporting studies in their analysis of training. However, they strongly encouraged practitioners and researchers to conduct more evaluation studies of the effectiveness of instructional design interventions.

Applying the Process to Both Academic Education and Training Programs

Specific job training has precise, immediate requirements with identifiable and often measurable outcomes. The instructional program must stress the teaching of knowledge and skills for the performance of assigned tasks. Formal education, on the other hand, often has broad purposes and more generalized objectives. Application of the knowledge and skills taught may not become important until sometime in the future.

Whether one is studying history or carpentry, the identical principles of learning apply to structuring experiences for individuals. Although the emphasis, terminology, and details differ, both situations involve similar elements of the instructional design plan. Thus, the process presented in this book can be effective for either an academic or a training situation. Where particulars differ, special explanations and examples are included in either the academic instruction or the planning for training.

Benefits of instructional design in business The benefits of the application of instructional design in business can take many forms. Results can vary from simply reducing the amount of time it takes to complete a course to solving a performance problem by designing effective instruction that increases worker productivity. The role of instructional design and training varies from company to company, as do its benefits. For example, Speedy Muffler King, which experienced high revenues and profits for 1994, made extensive use of training. During 1994, the company provided more than 100,000 hr of employee training to improve customer satisfaction and loyalty (Canada NewsWire, personal communication, February 1996). Appropriate training can produce a return on investment for both tangible (e.g., increased output) and less tangible (e.g., worker loyalty) measures. A contemporary organizational view of training is one that views training as value driven rather than a more traditional view as an operational function or cost center. For example, PricewaterhouseCoopers cut costs in many areas, but increased its investment in employee training. Similarly, Booz Allen Hamilton sees employee training as an investment that gives them a long-term advantage (Fox, 2003). IBM (2014) found that teams who received 40 hr of training per member were more likely to meet their project goals three times as often as those who received 30 hr or less.

Benefits of instructional design in PK–12 education Do PK–12 teachers have to be instructional designers in addition to their traditional roles of classroom manager, presenter-lecturer, and mentor? Our definitive answers are “to some degree” and “it all depends.” By saying “to some degree,” we mean that textbooks, workbooks, basal readers, and other standard instructional resources rarely, if ever, are sufficient to satisfy benchmarks and standards while keeping students engaged and interested. There are numerous occasions (many teachers might say “every day”) when the need for teacher-developed materials—drill-and-practice exercises, remedial lessons, problem-based lessons, or even full-fledged instructional units—arises. Knowing the basic principles of instructional design can help to ensure that what is produced serves a necessary purpose, meets the needs of students, is attractive and well organized, is delivered in an appropriate mode, and is continually evaluated and improved. Unlike professional instructional designers, however, the typical teacher is not likely to need formal expertise in the various instructional design processes. However, basic familiarity with major principles and procedures (e.g., how to present text, design and deliver a lecture, and prepare a test) can be extremely helpful, both for the teacher’s own work and for the evaluation of commercial educational products.

How teachers use the instructional design process also depends a great deal on situational factors. Teachers working in today’s restructured schools may find themselves

increasingly involved in design activities. Specifically, in recent years, national initiatives for educational reform have generated support for both teacher-centered instruction and activity-oriented, student-centered methods of teaching that stress meaningful learning applied to real-world problems (see Desimone, 2009; Rowan, Camburn, & Barnes, 2004). The choice between these approaches often depends on school preference, instructional needs, the nature of instructional objectives, the instructional time available (student-centered learning approaches take longer to implement), and available resources. Given the importance of designing contemporary educational programs to address technological literacy and twenty-first-century learning skills, Morrison and Lowther (2010) provide an inquiry-based instructional design model for teachers to use in integrating computer technology into classroom instruction.

Implementing these approaches obviously requires well-designed instructional activities and projects. Where do they come from? For the most part, the responsibility of design falls on individual teachers. Not surprisingly, however, many teachers find themselves unprepared for the task, and the implementations of the new strategies suffer as a result (Desimone, 2009; Fischer, et al., 2018; Mishra & Koehler, 2006). By learning more about instructional design, teachers should become better equipped either to create high-quality, student-centered lessons or to adapt commercial materials to fit their course needs. An analysis of factors affecting successful school improvement found that schools seeking to improve student achievement need both an effective implementation strategy and effective instructional design (Rowan, Correnti, Miller, & Camburn, 2009).

In the remainder of this chapter, we introduce the instructional design process by examining the context in which it is used and the premises underlying the process; we also introduce you to the model described in this book.

Expert's Edge

A Fresh Look at Instructional Design

There are many exciting things about being an instructional designer. One that excites me most is how versatile the field is; almost every company and every industry needs an expert who can help develop and implement effective training practices. For example, Fortune 500 companies need instructional designers to work with human resources departments, instructional designers can be employed in the restaurant industry to establish training procedures, or professors in an online program can benefit from the skills of an instructional designer. This variety of opportunities results in a dynamic field for instructional designers. In my own experience, I work with different subject-matter experts and content within an online higher education program, which makes my everyday work refreshing and exciting, yet the change of content provides new and rewarding challenges.

Another reason why it's exciting to be an instructional designer is that it provides opportunities to work with both people and technology. At times, I work with instructors and professors who are not always confident in applying technology and learning tools to their online courses. Being able to break down difficult concepts so that they can see how technology can benefit their teaching strategy is rewarding, especially when implementation and understanding of the technology are a success.

It's exciting to assist in adjusting pedagogy so that learning is more effective and appealing to different learning styles. I advocate for learners so that they can achieve their learning

objectives in a way that is appropriate for their capabilities. Today's diverse student body and workforce have resulted in a variety of learning needs, including those of individuals with impairments. Instructional design plays an integral role in assuring that all learners have a chance to succeed in their educational goals.

Finally, with the advancement in learning technologies and the drive of learners to obtain knowledge, instructional design is exciting because of the chance it affords to innovate. In my work, I'm asked to evaluate new technologies to determine if their use would be beneficial to the overall learning goals of the institution. As an instructional designer, I enjoy being part of a driving force of change in education.

What Difference Does Instructional Design Make? Utilizing instructional design principles and models can result in significant change in the overall learning process. Instructional design bridges the gap between content and learning by evaluating the current state and needs of a learner and setting appropriate goals for instruction. In addition, instructional design results in the creation of an "intervention" to facilitate the newly defined instructional goals.

Instructional design focuses on the learner, the instructor, and the dissemination of content by adjusting pedagogies that result in efficient, effective, and appealing learning situations for a variety of learning types. Learning is no longer a one-way street where learners are "talked at" and asked to recite material verbatim. Instructional design makes a difference in establishing the best way to articulate and assess learning.

What Do You Hope to Achieve Through Instructional Design Work? My goals in doing instructional design work include improving the way learning is done by advocating the needs of the learner. I also hope to improve learning by inspiring instructors, trainers, and professors on how they can branch out from the typical course lecture (talking head) to a more interactive course environment. In doing so, I hope to stimulate effective learning that leads to the overall retention and success of adult learners. On a greater scale, I hope to take part in innovative research that continues to shape how learners, instructors, and content interact.

Julie Y. Tausend is the instructional designer for the WebCampus division at Stevens Institute of Technology (Hoboken, New Jersey). She is responsible for the design of online courses and assists instructors with adjusting their pedagogy for effective online instruction. She previously worked for Cornell University's online certificate program eCornell as content architect.

WHAT IS INSTRUCTIONAL DESIGN?

Using a systematic design process is termed *instructional design* (often abbreviated *ID*). It is based on what we know about learning theories, information technology, systematic analysis, educational research, and management methods. Dewey (1900) saw a need in the early part of the twentieth century for a science that could translate what was learned through research into practical applications for instruction. This science would make decisions about instructional practices based on sound research rather than intuition. Snellbecker (1974) and others have proposed that instructional design is the linking science described by Dewey. We agree with Snellbecker and see instructional design as the process for designing instruction based on sound practices.

Instructional design starts by first identifying the performance problem and *never* assumes that instruction is the answer to *all* problems. *If* instruction is the most appropriate solution, *then* the design process can begin. The instructional design approach considers

instruction from the perspective of the learner rather than from the perspective of the content. The traditional approach simply asks, "What information should I include in this course?" In some courses, the chapters in the textbook determine the content. In contrast, the ID approach focuses on many factors that influence learning outcomes, including the following:

- What level of readiness do individual students need for accomplishing the objectives?
- What instructional strategies are most appropriate in terms of objectives and learner characteristics?
- What technology or other resources are most suitable?
- What support is needed for successful learning?
- How is achievement of the objectives measured?
- What revisions are necessary if a tryout of the program does not match expectations?

Other issues inherent in the instructional design process also influence student learning. This process is applicable for designing instruction in public education, higher education, and the workplace. The information, concepts, and procedures presented here can aid teachers and instructors, instructional designers, and planning teams—anyone who wants to develop effective, appealing instruction.

How would you answer this question: "If you were about to start planning a new unit in a course or training program, what issue would first receive your attention?" Various individuals might answer as follows:

Primary-grade teacher: "I think first about the common core standards and how this content aligns with those standards. Then, I would ask, *How well prepared are my students to learn it (physically, emotionally, intellectually)?*"

High school teacher: "First, I would start by identifying the relevant standards for the particular course, then I'd start writing down what I want to accomplish in teaching the unit to meet these standards. These statements become the goals around which I'll plan the instruction."

College professor: "My approach is to list the content that needs to be covered relative to the selected topic. This list would include the terms, definitions, concepts, and principles that I feel need to be communicated to my students."

Instructional designer in industry: "I would start by determining whether the problem the training is to address is an instructional problem. If instruction will help solve the problem, then it's important to start by listing the skills and knowledge the trainees are to develop as a result of this instruction. These goals would translate to the outcomes or objectives to be accomplished."

The foregoing replies represent a sampling of approaches that might be taken as different individuals initiate their instructional planning. There could be other replies to the question. For example, one community college instructor always starts by writing the final examination for a new unit. He believes that passing the final exam is the students' greatest concern. Therefore, he writes questions that indicate what should receive emphasis in his teaching. His reasoning seems plausible.

As you read the replies to the question and formulate your own answer, two conclusions become apparent. First, a number of different considerations appeal to educators and instructional designers as each starts planning. Second, each of us selects an order or sequence of our own to treat these elements.

Instructional design is a systematic process for creating instruction based on scientific research that produces effective, efficient, and reliable instruction. *Instructional development*

is often interpreted in different ways, and the term is sometimes used interchangeably with *instructional design*. Frequently, instructional development is defined as the production process, that is, the translation of the instructional design plan into the instructional materials such as print, video, multimedia, or web-based materials. Another definition describes instructional development as the management function in systematic instructional planning. This term includes assigning and supervising personnel, handling allocated budgets, arranging for necessary support services, and checking time schedules for compliance.

Education Versus Training

We should consider the distinction between education and training. Both education and training are concerned with learning; however, each has a different perspective and purpose. One of the goals of formal education is to prepare an individual to be a contributing member of society. The focus of an education is quite broad and can range from history to English to chemistry to physical fitness to political science to music. Formal education also occurs during a fixed time frame. For example, classes for students in grades 1 to 8 typically start in late August and continue to early June. University courses follow a similar schedule: Classes typically start by the first week of September and end in early December, with a second semester starting in January and ending in May. The content of a course is typically defined by its time frame and the number of chapters in the textbook used. However, with the recent emphasis on student performance, the content of many elementary and secondary education programs is more likely to be defined by benchmarks or standards than by a textbook.

In contrast, training in an organizational setting is defined by the information needed to perform a specific task or related tasks. For example, a course in using a fire extinguisher would not include information on how the pump on a fire truck works or a lecture on the history and use of fire. The course would focus on selecting the correct fire extinguisher and then on how to use the fire extinguisher. The length of the course would be determined by the content rather than a specific time frame. The purpose of training is more narrowly focused than is education in that training centers on very specific information—only the information needed to perform the task. There are, however, courses that are designed not to provide the needed instructional time but to fill a 40-hr time frame in order to mimic the work schedule.

Instructional Design and Human Performance Technology

An area related to the interest of the instructional designer is the applied field of human performance technology, or human performance improvement. Human performance technology places a strong emphasis on front-end analysis to identify the underlying cause or causes of a performance problem. A performance technologist takes a broader perspective than does a trainer by considering training and nontraining interventions as potential solutions to a performance problem (Stolovitch & Keeps, 1999). The performance technologist might involve an organizational development specialist, a compensation specialist, an information technologist, an ergonomics specialist, or an industrial engineer to provide a nontraining intervention. Performance improvement interventions might include restructuring job compensation, redesigning a workstation, or designing a simple job aid—in addition to or in place of training.

Contexts for Instructional Design

We can apply instructional design in any context in which people are performing a task. Let's examine some of the contexts in which instructional designers work.

Business and government Training represents a major investment by corporations and companies. In 2017, U.S. companies spent $93 billion dollars on training, a 32.5% increase over spending in 2016 (Training Magazine, 2017). Similarly, local and state governments as well as the federal government also make sizable investments in training. Training in business and governmental agencies can be grouped into four broad areas: *Technical training* can include developing materials that focus on repairing a piece of equipment, performing an accounting audit, or learning to use computer software. *Soft-skill training* includes interpersonal communication skills such as building teams or working at help desks to solve customer or employee problems. *Management and supervisory training* is another focus area of instructional designers. Supervisory training often involves learning how to assess employee performance and correct behavioral problems. The last group, *sales training*, includes not only sales techniques but also product knowledge training.

Medical Hospitals, medical schools, and other medical-related agencies hire instructional designers to design training and employ other techniques for improving performance. Professionals from doctors to nurses to technicians participate in continuing education to update skills knowledge and to maintain certification. Instructional designers working in a medical school typically focus on developing instructional materials as well as collaborating with teams to develop innovative instructional tools to allow students to practice and learn critical techniques in a simulated environment. Instructional designers also create patient education materials on such topics as the role of nutrition in diabetes, stress reduction, and wellness.

Military The various branches of the U.S. military are constantly training their personnel. This activity can range from basic training to the repair of atomic submarines to tactical planning. The military employs instructional designers and also contracts with corporations to develop the needed courses. Unlike most other organizations, the military utilizes a very strict process that all designers must follow when designing instructional materials.

Education Although limited, there are some positions for instructional designers in PK–12 schools, usually in very large school districts. The requirements for certification vary among states, and some states do not recognize instructional design specialists. More commonly, teachers select instructional design as a major for their master's degree and then find employment as a technology specialist in their school or district.

There are many opportunities for instructional designers in higher education. Many community colleges, colleges, and universities hire instructional designers to work with faculty to improve teaching skills and assist with course development. Today, a growing number of instructional designers are employed to work on the design and development of distance education courses.

One can see that there are a variety of employment opportunities for instructional designers. A recent report indicates a job-growth rate of 28.3% through 2022 whereas the annual growth of students receiving degrees in ID is only 3.7% (Riter, 2016). The basic process we describe in this book is applicable in all these various contexts in which instructional

designers are employed. Before we give an overview of the instructional design process and our instructional design model, let's examine the premises underlying the instructional design process.

Premises Underlying the Instructional Design Process

We have identified seven basic premises to help you understand the ID process and apply it successfully. These premises can influence both your thinking and your treatment of the instructional design plan.

Premise 1: The instructional design process requires attention to both a systematic procedure and specificity for treating details within the plan.

The term *systematic* refers to an orderly, logical method of identifying, developing, and evaluating a set of strategies aimed at attaining a particular instructional goal. This task is accomplished using the nine interrelated elements of the instructional design plan.

Treating each element requires exacting mental effort. Each element of the plan (if it is relevant to your project) must be applied with attention to precise details. This process means being specific. For example, an instructional objective is a statement that includes a verb. We can use this verb and other information in the objective to determine whether we are designing content that will address the performance problem we have identified. Consider this objective: The learner will list in order the steps for restocking the soft-drink machine. The objective has all the necessary information and specificity of performance. However, if the problem is one of personnel incorrectly restocking the machine, then our objective does not address the problem. The learners can write down the steps, but there is no guarantee they can actually perform the task. The content and verb in the objective also guide the development of an instructional strategy and indicate how achievement will be evaluated. The details of the instructional strategy are used to develop the instruction that will support the objective. Similarly, the details included in the specification of the objective are used to determine how to assess the learner's mastery of the objective. These are examples of factors that indicate the specific treatment required when implementing the instructional design process. When designing appropriate instruction, each part of the process depends on one or more earlier tasks.

Attention to detail is critical for the success of any instructional design work. By applying systematic procedures and being attentive to specific details, you can design effective instruction.

Premise 2: The instructional design process starts by identifying an instructional problem.

Instructional designers first determine if there is a performance problem. Once a problem is identified, the designer must determine whether it can be solved efficiently by instruction *before* he or she starts designing the instruction. In contrast, organizations often bring in guest speakers or provide workshops on general topics such as time management or business writing without first clearly identifying a need. To answer the question of what to include, the instructional designer begins by identifying the performance problem and then uses a variety of tools to determine what knowledge and skills are needed to solve the problem.

Premise 3: An instructional design plan is developed primarily for use by the instructional designer and planning team.

Some people believe that all details developed as part of the design process (e.g., needs analysis, instructional objectives, content sequencing, etc.) should be given to learners, often

in the form of a study guide. This assumption is not true. The learners will use some of the items written as elements in the plan, but not always in the form or order in which they are being developed. We distinguish between the instructional design documents (e.g., needs analysis, instructional strategies, task analysis, etc.) and the instructional materials the learners will actually see and use. The design team prepares a design document, that is a blueprint, to manage the development of the instructional units. Once the instructional materials are in final form, the design documents lose their value for the project and usually are filed.

Also, the order in which elements are treated during planning may differ substantially from the order in which they are eventually presented to learners. For example, a pretest might be developed after the final examination is devised, even though students will complete it prior to the start of instruction.

Premise 4: While planning, every effort should be made to provide for a level of satisfactory achievement rather than minimal achievement for all learners.

A classic study by Bloom (1976) concluded that up to 95% of all public school students can accomplish what is required of them if each individual has suitable academic background, appropriate instruction, and sufficient time for learning. Other research has shown that if a student is prepared to learn and puts forth the effort to study but is unsuccessful in learning, a more careful design of the instructional plan can help overcome this shortcoming. This conclusion applies to training as well as to education. It justifies the need to test a plan before its implementation, as illustrated in the revision oval in Figure 1.1.

Premise 5: The success of the instructional product is dependent on the accuracy of the information flowing into the instructional design process.

To solve a performance problem, the designer must identify the performance problem or need through the use of needs analysis, goal analysis, and/or performance analysis. Creating instruction for a task that is not a performance problem is not likely to lead to an improvement in performance. Similarly, the designer must accurately identify the target audience to design materials that are appropriate for the audience's reading and skill levels. The information obtained from the subject-matter expert must be accurate and complete. Selecting an appropriate instructional strategy for the content and objectives is essential for both efficient and effective instruction. Finally, accurate information is needed from the formative evaluation of the materials to make appropriate modifications. Failure to obtain accurate information and to make the correct decisions can result in ineffective instruction.

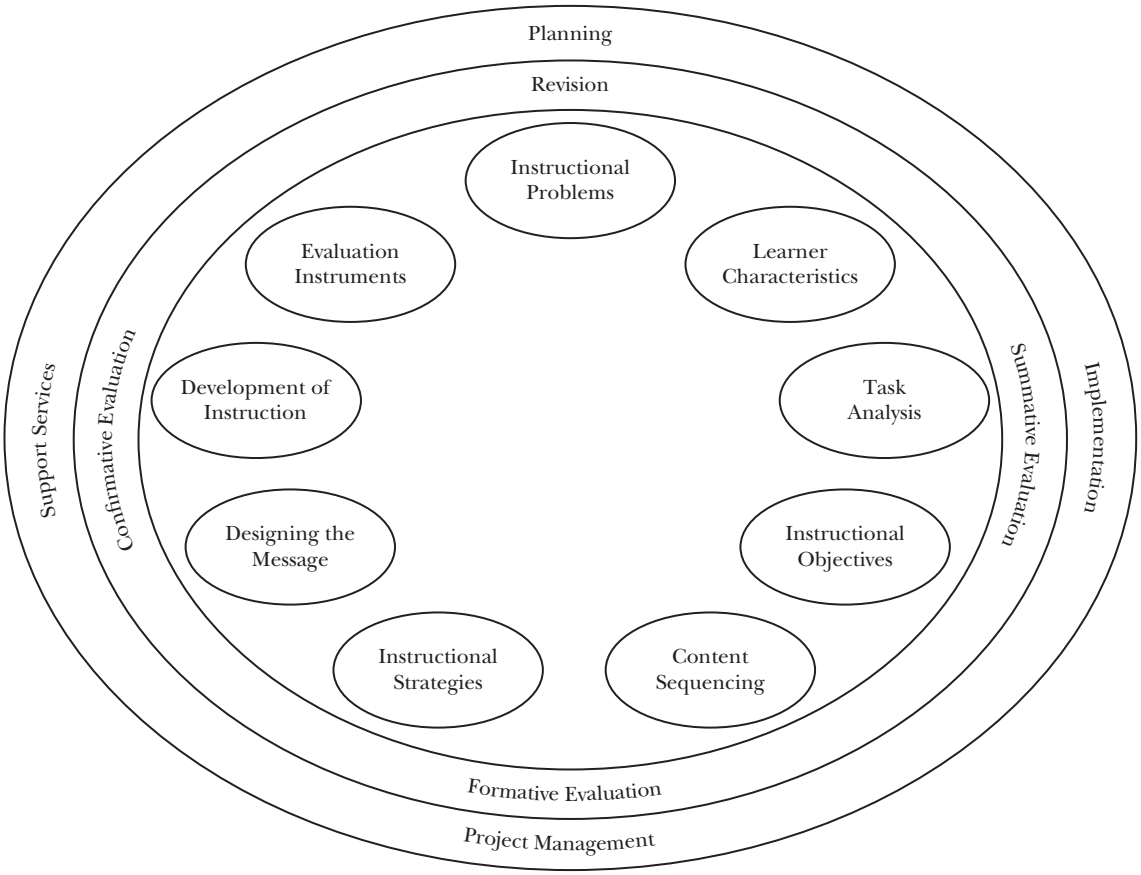
Premise 6: The instructional design process focuses on the individual rather than the content.

Instructional design focuses on the individual and how to improve individual performance rather than on what content to cover. During the learner analysis, the process focuses on audience characteristics. As we design the instruction, we consider these characteristics in the selection of the instructional strategies and delivery methods that are adapted to the individual members of the target audience. Throughout the design process, the designer focuses on the individual learner and what the learner must master to alleviate a problem rather than focusing on what content to cover.

Premise 7: There is no single best way to design instruction.

Applying the instructional design process can reduce reliance on intuition or trial and error in planning. Yet the instructional design process has not reached a level of scientific exactness. Many paths can reach the same goals and objectives. Instructors and designers

FIGURE 1.1
Components of the Instructional Design Plan



are unique individuals, just as learners are unique. Each designer formulates activities and applies elements of the instructional design plan in individual ways. The proof of an instructional plan's success is whether a satisfactory level of learning is achieved in an acceptable period of time.

Expert's Edge

Is ADDIE a Blond, Brunette, or Bald?

One of the terms you hear most frequently in the field of instructional design is "the ADDIE model." Critics might say, for example, that the ID model presented in this book is "a variation of the basic ADDIE model." But what is the ADDIE model? As it turns out, there is no such thing as *the* ADDIE model or even *an* ADDIE model.

If you search the dictionaries and encyclopedias of instructional technology, education, and training, ADDIE does not appear in any of them. Nor in the histories of instructional technology and ID. Nor in the textbooks on ID. Most notably, ADDIE does not appear in any of the books that survey and critique the various ID models. And yet everyone talks about it as if it actually existed.

After an extensive survey of the literature and numerous interviews with the "seasoned citizens" of ID, I have concluded that the term *the ADDIE model* is merely a colloquial label for a systematic approach to instructional development, virtually synonymous with *instructional systems development* (ISD). It is an acronym referring to the major stages in the generic ISD process: Analysis, Design, Development, Implementation, and Evaluation. The label seems not to have a single author but rather to have evolved informally through oral tradition around the 1980s. There is no original, fully elaborated model, only a label that refers to a family of models that share common basic elements.

Although the origin of the *label* itself is obscure, the underlying concepts of ISD can be traced to the model developed for the U.S. armed forces in the mid-1970s. As Branson (1978) recounted, the Center for Educational Technology at Florida State University developed detailed procedures that evolved into the Interservice Procedures for Instructional Systems Development (IPISD), intended for the Army, Navy, Air Force, and Marine Corps. The center's graphic depiction of the IPISD model (Branson, 1978, p. 13) shows five top-level headings: Analyze, Design, Develop, Implement, and Control. This model is referenced in subsequent historical reviews of ID, but, notably, users do not refer to it by the *ADDIC* acronym, only IPISD.

The underlying concepts of the IPISD model can be found in an earlier handbook by Leslie Briggs (1970). Briggs's model incorporates ideas similar to the IPISD model but without the ADDIC headings.

Some ID authors are now trying to retroactively create an ADDIE model because the label is so popular. They take the five-stage outline and then go on to spell out procedural steps for each stage and to give narrative descriptions of those procedures. However, it should be recognized that authors who do this are essentially creating and disseminating *their own* models, as there does not appear to be an original, authoritative version of the ADDIE model to be revealed and interpreted. Anyone is free to impute whatever attributes they want to this label . . . and they do.

References

Branson, R. K. (1978, March). The interservice procedures for instructional systems development. *Educational Technology*, *18*(3), 11–14.

Briggs, L. J. (1970). *Handbook of procedures for the design of instruction*. Pittsburgh, PA: American Institutes for Research.

Molenda, M. (2003). In search of the elusive ADDIE model. *Performance Improvement 42*(5), 34–36.

A longer version of this story, complete with references, appears in Molenda (2003).

Michael Molenda is an associate professor emeritus. He retired from the Instructional Systems Technology program at Indiana University. He continues to do research and writing related to the history and conceptual foundations of instructional technology.

OVERVIEW OF OUR DESIGN MODEL

Think back to how the primary-grade teacher, high school teacher, college professor, and instructional designer answered the question of how they would design a course (see the section "What Is Instructional Design?"). Of the planning elements identified by the four individuals, four are fundamental in instructional design. You will find them addressed in almost every ID model. They can be represented by these questions:

1. For whom is the program developed? (i.e., characteristics of learners or trainees)
2. What do you want the learners or trainees to learn or demonstrate? (i.e., objectives)
3. How is the subject content or skill best learned? (i.e., instructional strategies)
4. How do you determine the extent to which learning is achieved? (i.e., evaluation procedures)

These four fundamental components—learners, objectives, methods, and evaluation—form the framework for systematic instructional planning (Figure 1.2).

These components are interrelated and could conceivably make up an entire instructional design plan. In actuality, additional components should require attention (e.g., the context in which the learner learns and works) and, when integrated with the basic four, form a complete instructional design model. The following paragraphs describe the elements of our instructional design model.

Instructional Problems

The first step of the process is to identify the need of the client or the performance problem the client wishes to solve. If the need identified is best addressed by instruction, then the designer proceeds with the project. If the need identified requires a noninstructional solution, the designer may implement a noninstructional intervention, refer the problem to other specialists, or work with a team of specialists to implement the most appropriate solution. For example, the designer might work with other specialists to redesign a workstation to make it ergonomically correct. The performance problem is associated with the target audience, and the client is often a manager or supervisor of the audience.

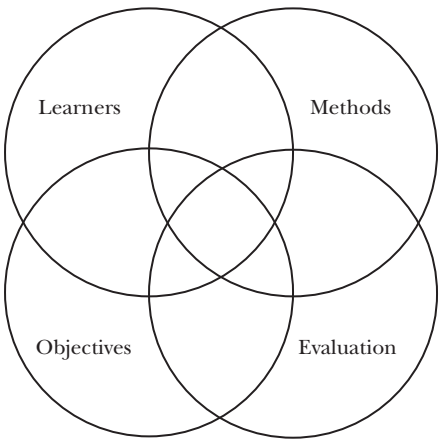


FIGURE 1.2
The Fundamental Components of Instructional Design

Learner and Context

One aspect of the analysis is defining the characteristics of the target audience, or those individuals who are not performing as expected. You might collect information about the learners' reading level, general background knowledge, assumptions, or work experience. The information you collect will depend on the problem and the audience. For example, a fifth-grade teacher might find value in the students' scores on the previous year's benchmark or achievement tests. A designer for an accounting firm might find knowing the number of years the learners have worked in accounting more useful for planning instruction than information about their general background or reading level.

Task Analysis

Task analysis is one of the most, if not the most, important component of the process. You will use this process to determine what knowledge and procedures you need to include in the instruction to help the learner master the objectives. You will also find that there are different techniques you will need to use for analyzing different types of content.

Instructional Objectives

The instructional objectives specify exactly what the learner must master. The objectives provide a map for designing the instruction and for developing the means to assess learner performance. We use the objectives as one of our first quality checks to make sure that the instruction (including the learning activities) we develop is focused on solving the performance problem. As we begin to design the instruction, the objectives establish a focal point to make sure our strategies and assessments are appropriate.

Content Sequencing

The order in which the information is presented plays an important role in helping the learner understand and learn the information. At first glance, one might expect to present the information in the same sequence as defined by the task analysis. However, ordering the information in a logical sequence may help the learner grasp the ideas in a more efficient and effective manner.

Instructional Strategies

Many designers consider this part of the process the creative step. It involves designing creative and sometimes innovative ways of presenting the information that help learners integrate the new information with ideas they already understand. The process involves numerous approaches ranging from a simple analogy to a complex simulation all derived from numerous research-based approaches.

Designing the Message

The message is the pattern of words and pictures we create to communicate with our learners. The design of the message is the specific and deliberate process we use to arrange the words and pictures (Fleming & Levie, 1978). Once you have designed the instructional strategies, you can turn your focus to designing the message. This process uses techniques ranging from the way you structure a sentence using signal words such as "Recall in the last step . . . "

to the use of typographical elements such as bold or italics to direct the learner's attention. Selecting appropriate graphics, text, and typographical design can further enhance the readability and the learner's understanding of the instruction.

Development of the Instruction

Once you have completed the analysis and design, you are ready to develop the instruction. This part of the process involves putting all the parts together to produce instructional materials such as video recordings, web pages, print materials, or audiotapes.

Evaluation Instruments

The evaluation instruments are used to assess the learner's mastery of the objectives. Some objectives are easily assessed by familiar methods such as multiple-choice test items, whereas other objectives require more complex approaches such as a portfolio that is a collection of exemplary work products over a period of time.

These nine elements just described are the basic components of the design process presented in Figure 1.1. They overlap and are presented in an oval shape (see Figure 1.1) to indicate that *there is no one specific sequence or order to completing the steps.* It would seem logical to start with the instructional problem and then proceed clockwise. However, it is also logical to complete the design of the evaluation instruments immediately after defining the objectives. Similarly, if your job requires you to design instruction for the same group of learners (e.g., a fifth-grade class or field service engineers), then you will probably not need to complete the learner analysis in great detail after the first or second project because those characteristics remain stable.

Expert's Edge

The Challenge of Instructional Design

You would think that after 25 years of being in the same field, I would be bored with my career; however, working as a consultant in the field of training and human performance is anything but boring. My role is continuously changing, and I am constantly presented with new challenges and opportunities to grow.

When I started my career, I was working for a financial company. Most of my work consisted of writing training manuals and job aids. To accomplish my work, I followed the standard instructional design process. I would analyze my target audience and where they would take and apply the training. I would then analyze the manual content, sketch out a design, develop the manual, try the manual out on a few target audience members, revise the manual if needed, and publish it. The process was very similar to the coursework I did in my first instructional design course, except I did not create formal summative evaluations because the client did not want them. In the corporate world, formal assessments are often considered too academic and sometimes even offensive to adult learners.

After years of creating manuals, I changed jobs and worked for a software company that serviced auto dealerships. This position was a great learning experience. I not only had the opportunity to create a software training program for dealership personnel; I also had the opportunity to travel around the United States and teach the program. My students ranged from individuals who had never used a computer to individuals who built computers.

They also ranged in age and cultural background. I generally taught at a different dealership every day, so I had to perform a quick analysis of my students and adjust my training program accordingly. This position allowed me to hone my skills in what I call "flexing to my client." Learning to adjust my approach and behavior based on my client's demeanor and characteristics has allowed me to excel as an instructional design and human performance consultant. In this field, I work with a lot of different people, from the customers who pay for my services to subject-matter experts to target audience members. I consider all of these individuals to be my clients, and being able to "flex" to them enables me to build genuine trusting relationships. In turn, I can obtain what I need from my clients so that I can best serve them.

Later, I started working as a consultant to a manufacturing company. In contrast to my previous positions, where most of my time was spent on implementation, in this position I spent the most time on analysis and development. In my previous positions, I designed training for new software and procedures. The need for training was obvious. In my position as a consultant, clients often requested training to fix a problem. Upon performing a needs assessment, I sometimes found that the problem was not caused by a lack of knowledge or skills but by some other barriers, such as a lack of resources or incentives. Even when training was needed, I often found that training alone would not fix the problem because other barriers existed that the company needed to address.

I spent more time on analysis not only because I needed to ensure that training was required but also because the training content was much more complex when training was required. For many projects, the content was so complex that analysis of the detailed content continued as I proceeded through the design and development phases.

Because of the increased need for consistent training to geographically dispersed target audiences, much of the training I developed was web-based. Developing web-based training as opposed to classroom training increased the time I spent on development by about four-fold. Also, the complexity of the content contributed to time spent on development because I would have to wait for busy subject-matter experts to supply the content details that were not captured during analysis and design.

Today, I continue to work as a consultant to a manufacturing company. I still spend a lot of time on analysis and development. However, the training solutions that I recommend and support have evolved beyond formal training courses. In today's environment, the workforce is lean, and most workers have minimal time to devote to formal training. In addition, workers are inundated with information that they need to perform their duties, and this information changes rapidly. To accommodate workers in this environment, training solutions often include single-point lessons, on-the-job mentoring/coaching, job aids, and informal training solutions, such as online knowledge sites with discussion boards or road shows with expert panel discussions. Today, my instructional design colleagues and I spend as much time on supporting worker-to-worker knowledge sharing as we do on creating formal training.

Shannon DeGregory is a consultant on instructional design and human performance. She has worked in the training industry for 25 years and has training experience in mortgage auditing, benefits, actuarial, auto dealership software, engineering, manufacturing, and accounting.

Ongoing Processes

Eight processes that are ongoing throughout the life of an instructional design project are presented in the two outer ovals of Figure 1.1. The following paragraphs describe these processes.

Planning and project management Instructional design projects vary in degree of complexity and the amount of planning and management that they require. These two processes are essential for developing and managing the schedule and budget for a project. The effort required for project management is determined by the scope of the project.

Support services The size and scope of the project will determine the resources that are essential for its success. For smaller projects and those with a short time frame, the instructional designer might provide, in addition to the instructional design processes, all the services required, from typographer to evaluator to graphic artist. For large-scale projects, support services might include a number of specialists, such as graphic artists, scriptwriters, video producers, or programmers, to support the development and production of the instructional materials.

Formative evaluation and revision Your design and development work on a project is evaluated at multiple places during the process. Such "formative evaluation" processes (see Chapter 13) can start with the problem identification step to ensure that you have correctly identified the problem. Similarly, you may conduct reviews of the task analysis and objectives to verify that you are correctly addressing the problem. Once you have designed the strategies and created a draft or prototype of the instruction, you can conduct additional reviews to test their effectiveness. Using the information that you or the evaluator gather, you can make revisions to improve the quality of the instruction.

Implementation As you design the instruction, you must also plan for the implementation. Careful planning and involvement of key individuals during the design of the instruction can improve the implementation and use of the instruction. Implementation, like formative evaluation, starts early in the instructional design process. Planning for the implementation early can help ensure a smooth rollout of the instructional program.

Summative evaluation Once the instruction is implemented, you or your evaluator can conduct a summative evaluation. This evaluation is used to evaluate the effectiveness of the final materials when they are used as planned.

Confirmative evaluation In business, training courses are often institutionalized and offered to employees long after the problem they addressed is gone. Confirmative evaluation is a process instructional designers use to determine whether a course or instruction remains appropriate over time.

WHO'S WHO IN THE INSTRUCTIONAL DESIGN PROCESS

As you prepare to study the instructional design process, you will want to view it from your own perspective. What role or roles will you assume in an instructional project? What specific responsibilities might you have? What relationship do you have with other individuals in your organization who are involved in aspects of designing or delivering instruction? These are all matters to keep in mind as you study the elements of instructional design. Let us examine three essential roles in the instructional planning process. You may be expected to fill one or more of these roles.

Instructional Designer

This person is responsible for carrying out and coordinating the planning work and is competent in managing all aspects of the instructional design process. The instructional designer has the primary responsibility for designing the instruction.

Subject-Matter Expert (SME)

The subject-matter expert is qualified to provide information about content and resources relating to all aspects of the topics for which instruction is to be designed. This individual is responsible for checking accuracy of content treatment in activities, materials, and examinations. The teacher or instructor may serve also as an SME.

Evaluator

This person is qualified to assist the staff in developing instruments for pretesting and for evaluating student learning (i.e., posttesting) and is responsible both for gathering and interpreting data during program tryouts and for determining the effectiveness and efficiency of the program after it has been fully implemented.

During various stages of the process, you may involve other individuals such as media production personnel, instructors, and facility planners and managers.

ANSWERING THE CRITICS

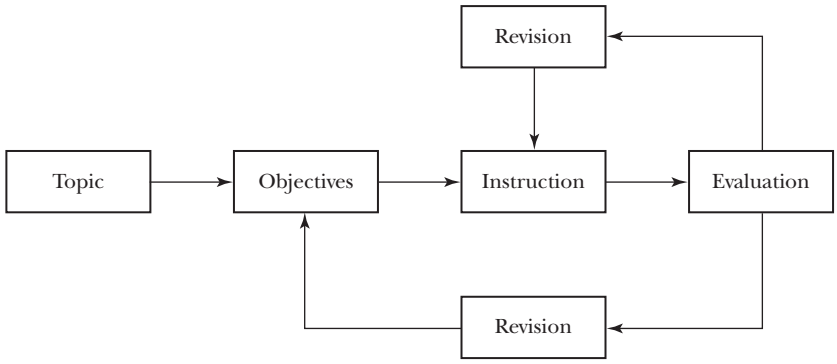
Isn't the instructional design process actually a mechanistic rather than a humanistic method of instructional planning? Doesn't this procedure discourage creativity in teaching? Isn't teaching more of an art than a science? These and similar questions are frequently raised and must be answered realistically. After studying this book, you should make up your own mind about how to answer them. Following are our responses to such questions:

Question: Isn't the instructional design process actually a mechanistic rather than a humanistic method of instructional planning?

Some ID models exhibit rigidity, following only a single, linear path for planning, represented by a chain of boxes and arrows, without exception. Figure 1.3 illustrates this approach. The sequences should be flexible, with elements addressed in a logical order for each project. The instructional designer's style of working, the nature of the subject, environmental constraints, and the learner's needs can all influence how the components are addressed in planning. The ID process would be mechanistic only if elements were treated in a fragmented manner rather than in an integrated approach. That is, the elements must work together rather than be treated as isolated steps.

A humanistic approach to instruction recognizes the individual learner (i.e., student or trainee) in terms of his or her own capabilities, individual differences, present ability levels, and personal development. It should be apparent that these matters do receive attention in the instructional design process. Elements of the process include examination of learner characteristics and identification of readiness levels for learning. Furthermore, systematic planning is applied to designing various forms of instruction to address the learner's needs.

FIGURE 1.3
A Typical Instructional Design Model



Philosophically, as the planning starts, the instructional designer or instructor might have the following perspective: "I am designing a program of learning experiences for learners so that together we will be successful in accomplishing the stated goals and objectives. Although it is important for each person to learn, it is equally important to me that the learner become proficient." A successful instructional program is one in which the majority of the students succeed, reaching a mastery level in accomplishing the specified outcomes. Grading on a bell-shaped normal curve and assigning letter grades would have no place in such instruction designed to improve performance.

Question: Doesn't the ID procedure discourage creativity in teaching?

In fashioning a fine work of art, the artist creatively uses a number of widely accepted design elements (unity, emphasis, balance, space, shape, color, etc.). This same principle applies to instructional design. The effective instructional designer considers all the elements of the process to design a creative instructional approach. A good design goes beyond mere effectiveness. It is efficient, engaging, and interesting.

Design requires creatively applying learning principles while taking into account characteristics of individual components and necessary relationships among elements that may constrain the design. These nine design elements, discussed earlier, can be developed and manipulated in imaginative and creative ways. Although the nine elements are the basis for good instruction, innovative and creative approaches result from how you, the instructional designer, apply the process.

Two individuals teaching the same subject or topic and targeting the same outcome goals might very well design different plans. Both can result in equally satisfactory student learning. The process demands dynamic interactions between students and instructor and between student and content, and different activities may be developed to satisfy those demands. This process encourages creativity, even to the extent of providing for open-ended or unanticipated learning experiences.

Question: Isn't the main attention in ID given to low-level, immediate learning outcomes rather than to higher order, long-term outcomes?

Low-level, immediate outcomes are typical of instructional designs that implemented a strict behavioral approach using such strategies as mathemagenic behaviors (Rothkopf, 1970). Designers and researchers tend to implement strategies, such as inserted questions,

proposed by Rothkopf, with a focus on very narrow, specific bits of information. Learners quickly discover they can search for a specific answer (intentional information) by skimming and ignoring all other supporting information (incidental information). As a result, learning is primarily rote; the *task* requires only the recall of specific information. In contrast, instructional design models based on cognitive strategies can provide a means of facilitating the development of higher level learning involving analysis, synthesis, and problem solving.

In many academic subject areas, learners achieve major learning outcomes only after they have completed a class and then enrolled in an advanced course or begun working at a job. Instructional design includes procedures for directly and indirectly evaluating postcourse behavior and content application outcomes.

These answers to the critics may seem unconventional. Many teachers and trainers, based on their beliefs and experiences, might not accept them. Often people must become dissatisfied with present practices or results before they recognize the need for change and improvement (e.g., getting beyond passive learning, beyond accepting recall as an acceptable goal, when improved performance on a task or application of knowledge is a more appropriate outcome). Then they are probably ready to explore a fresh approach to creating effective instruction. Providing explanations and offering opportunities, as described in this introductory chapter, can help counter criticism of the instructional design process.

QUESTIONS ... QUESTIONS ... QUESTIONS

As you read and study the following chapters, you will frequently see questions raised or referred to in relation to the topic under consideration. Such questions may appear at the beginning of a chapter to indicate the important matters that follow. Then, as the discussion proceeds, other questions help direct thinking toward decisions that must be made.

An instructional designer continually probes for clarification, explanations, and details. You must help the persons with whom you carry out instructional planning to communicate effectively with you. This can best be done by using questions. Therefore, pay particular attention to the questions raised throughout the book. Then, let questioning become a common part of your behavior as you explore and eventually practice the instructional designer role.

SUMMARY

1. The use of instructional design to design and develop training can shorten training time and focus the training on the specific performance issue that can result in significant cost savings.
2. The instructional design process is applicable to a broad range of contexts that focus on improving human performance. These contexts can include but are not limited to education, business, health care, and the military.
3. A complete ID plan consists of nine elements arranged in a flexible configuration and formative, summative, and confirmative evaluations for potential revisions and judgments of success.
4. A number of expressions are synonymous with the term *instructional design* in the literature and in practice.
5. The ID process has the following qualities: It follows a systematic procedure with specific details, it usually starts at the course development level, and the process is applied in different ways by different designers but produces equally effective learning interventions.
6. The ID process can benefit program managers, administrators, instructional designers, instructors, and learners.

7. Roles in the ID process include instructional designer, instructor, subject-matter expert, and evaluator.
8. Criticisms of the ID process include the opinions that it is a mechanistic rather than humanistic planning method, that it discourages teacher creativity, and that its main attention is given to low-level, immediate outcomes. The ID process emphasized in this textbook counters these criticisms.
9. Asking questions during all phases of the ID process can help direct thinking toward decisions.

THE ID PROCESS

As you read through this book, you will use the instructional design process to create a unit of instruction similar to the one in Appendix B. In this section, we provide guidance for applying the concepts, skills, and processes described in the chapter. This section also provides you with additional heuristics on the design process.

To start, we recommend that you reflect on your own definitions and philosophies. First, what is your definition of instructional design? Second, which learning theory or theories do you subscribe to for designing instruction? Third, what is your view of the learner?

Lean Instructional Design

Instructional design is often criticized for taking too long. But time is relative, and time requirements are dictated by a number of circumstances. For example, you might take your car to the local garage or full-service filling station to have a flat tire fixed. Given the interruptions of customers wanting gas and those only asking for directions, it might take an hour or more to have your tire changed or repaired. In contrast, crews at the Indianapolis 500 routinely change *all* four tires in less than 10 seconds. Your local mechanic will probably receive about $20 regardless of how long it takes to do the job, whereas thousands of dollars are riding on the efficiency of the pit crew on race day.

Does that mean that all design tasks should be done with the speed of a pit crew working the Indy 500? No, not all the time. However, you will need to make some critical decisions. For example, consider an organization that is changing to a different telephone system and in a 2-hr training session must train 600 employees in how to use the new system. Given that this process is a one-shot training program, a designer would need to consider what value the design process could add. A simple task analysis presented as a lecture outline for the instructor might suffice in place of a lengthy development project. In contrast, a troubleshooting course for field service staff is more complex and has a longer life. In this example, the company's field service staff is growing at a high rate, and there is high turnover due to promotions. An investment in the design of the course would prove worthwhile even though it might take 6 months to complete. Recall the AT&T example from earlier in this chapter. An instructional design approach was not used for the first version of the course, which was lengthy and not focused on the performance requirements of the job.

To answer the critics, instructional design does take an investment of time and resources. However, the alternative is even more costly, as illustrated by the AT&T example. There are also times when instruction is not the answer (see Chapter 2) or when the problem does not warrant the investment of resources. A missed application of the instructional design process is a costly investment.

APPLICATION

In the "Getting Started" section at the beginning of this chapter, we described an unfortunate scenario of an instructional designer's first day on the job. How would you respond to the group's questions?

Write a job description for your ideal job. Next, refer to the nine elements in Figure 1.1 and see how many of them are described in your job description. Which elements did you include in your description?

ANSWERS

How would you respond to the "Getting Started" scenario? It seems the key issue, if you are to do your job, is not to overwhelm your new colleagues with instructional design terminology while clearly selling them on the concept of design. A friendly approach might be to discuss what you can do in concrete terms that they can understand. This job is going to take some gradual selling and building of both rapport with and support from the manager and staff. We suggest proceeding cautiously but do everything you can to be helpful. As part of a sales job, you might work with the group to identify a performance problem and then work with them to design an appropriate solution. Again, keep in mind your audience of coworkers, and approach the task in a way that will help them adapt your instructional design approach.

Which design elements would you include in your job description? Asking us to pick one or two is like asking parents to select their favorite child! Each of us enjoys doing certain tasks more than others, but we recognize that all the different elements are essential and important in the design, development, and implementation of an effective and efficient product. We hope that you have a real interest in two or three of the elements but that you also develop your skills in all aspects of the design process.

REFERENCES

Aguinis, H., & Kraiger, K. (2009). Benefits of training and development for individuals and teams, organizations, and society. *Annual Review of Pscyhology*, *60*, 451–474. https://doi.org/10.1146/annurev.psych.60.110707.163505

Arthur, A., Bennet, W., Edens, P. S., & Bell, S. T. (2003). Effectiveness of training in organizations: A meta-analysis of design and evaluation features. *Journal of Applied Psychology*, *88*, 234–245. https://doi.org/10.1037/0021-9010.88.2.234

ASTD. (2011) 2011 State of the Industry Report. Retrieved from https://www.td.org/research-reports/astd-research-2011-state-of-the-industry-report

Bloom, B. (1976). *Human characteristics and school learning*. New York, NY: McGraw-Hill.

Davenport, R. (2005). A new shade of Big Blue: IBM reinvents its workforce. *Training and Development*, *59*(5), 34–41.

Desimone, L. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher*, *38*, 181–199.

Dewey, J. (1900). Psychology and social practice. *Psychological Review*, *7*, 105–124.

Fischer, C., Fishman, B., Dede, C., Eisenkraft, A., Frumin, K., Foster, B., … McCoy, A. (2018). Investigating relationships between school context, teacher professional development, teaching practices, and student achievement in response to a nationwide science reform. *Teaching and Teacher Education*, *72*, 107–121. https://doi.org/10.1016/j.tate.2018.02.011

Fleming, M., & Levie, W. H. (1978). *Instructional message design: Principles from the behavioral sciences*. Englewood Cliffs, NJ: Educational Technology Publications.

Fox, A. (2003). Training budgets said to be withstanding companies' economic troubles. *Human Resources Magazine*, *48*(7), 32–38.

Hughes, A. M., Gregory, M. E., Joseph, D. L., Sonesh, S. C., Marlow, S. L., Lacerenza, C. N., … Salas, E. (2016). Saving lives: A meta-analysis of team training in healthcare. *Journal of Applied Psychology, 101*(9), 1266–1304.

IBM (2014). *The value of training*. Somers, NY: Author.

Keith, N., & Frese, M. (2008). Effectiveness of error management training: A meta-analysis. *Journal of Applied Psychology, 93*, 59–69. https://doi.org/10.1037/0021-9010.93.1.59

Mager, R. F. (1977). The "winds of change". *Training and Development Journal, 31*(10), 12–20.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054.

Morrison, G. R., & Lowther, D. L. (2010). *Integrating computer technology into the classroom* (4th ed.). Columbus, OH: Merrill.

Riter, P. (2016, June 7). The quest for instructional designers. *Inside Higher Ed*. Retrieved from https://www.insidehighered.com/advice/2016/06/07/troublesome-shortage-instructional-designers-essay#.WI_StKWGmTY.mailto

Rothkopf, E. Z. (1970). The concept of mathemagenic activities. *Review of Educational Research, 40*, 325–336.

Rowan, B., Camburn, E., & Barnes, C. (2004). Benefiting for comprehensive school reform: A review of research on CSR implementation. In C. T. Cross (Ed.), *Putting the pieces together: Lessons from comprehensive school reform research* (pp. 1–52). Washington, DC: National Clearinghouse for Comprehensive School Reform.

Rowan, B., Correnti, R., Miller, R. J., & Camburn, E. (2009). School improvement by design: Lessons from a study of comprehensive school reform designs. In B. Schnieder, & G. Sykes (Eds.), *Handbook of education policy research* (pp. 637–651). London, UK: Taylor & Francis.

Snellbecker, G. (1974). *Learning theory, instructional theory, and psychoeducational design*. New York, NY: McGraw-Hill.

Stolovitch, H. D., & Keeps, E. J. (1999). What is human performance technology? In H. D. Stolovitch, & E. J. Keeps (Eds.), *Handbook of performance technology: Improving individual and organizational performance worldwide* (pp. 3–23). San Francisco, CA: Jossey-Bass/Pfeiffer.

Training Magazine (2017). 2017 training industry report. *Training, 54*(6), 20–33.

Wiggenhorn, W. (1990, July/August). Motorola U: *When training becomes an education*. Harvard Business Review, pp. 71–81.