Robert Maribe Branch

Instructional Design: The ADDIE Approach

Springer

Instructional Design: The ADDIE Approach

Robert Maribe Branch

Instructional Design: The ADDIE Approach

Springer

Robert Maribe Branch
Department of Educational Psychology and
Instructional Technology
University of Georgia
604 Aderhold Hall
Athens, GA 30602
USA
rbranch@uga.edu

ISBN 978-0-387-09505-9 e-ISBN 978-0-387-09506-6
DOI 10.1007/978-0-387-09506-6
Springer New York Dordrecht Heidelberg London

Library of Congress Control Number: 2009932903

Acknowledgments

I am grateful to my former colleagues in the Department of Instructional Design, Development and Evaluation at Syracuse University and my current colleagues in the Learning, Design, and Technology program at The University of Georgia for both allowing me to learn how to teach instructional design and encouraging me to share my use of ADDIE as an approach to instructional design.

I want to acknowledge the following members of the training department at Universal Instruments in Binghamton, New York, during the early to mid-1990s who helped shape some of my initial perceptions about authentic training development environments: Patricia Wrobel, Corporate Training Manager, Gregory Taylor, Customer Training Manager, and trainers Steve Austin, Charles Brown, Adolfo Lopez, and Edward Milot who comprised the ad hoc Instructional Design Group.

I look forward to the continued support of colleagues like Dr. Wendy Thompson, an Instructional Designer at the Charles Drew Biomedical Institute in Washington, DC, and my colleagues from a time back at the United States Bureau of the Census who provided opportunities for me to demonstrate the effectiveness of the ADDIE approach to instructional design with national implications.

I wish to thank Ted Lehne of the Learning Services Division at Delta Air Lines, Susan Greathead, President of Lead America Corporation, and Lynn Miller, Senior Enterprise Associate at the Center for Creative Leadership for their inspiration.

Contents

Prologue

Contents

Abstract ADDIE is an acronym for *Analyze, Design, Develop, Implement,* and *Evaluate*. ADDIE is a product development paradigm and not a model per se. The ADDIE concept is being applied here for intentional learning environments. The application of ADDIE to instructional systems design facilitates the complexities of intentional learning environments by responding to multiple situations, interactions within context, and interactions between contexts. Yet, the fundamental ADDIE components remain the same throughout various applications and variations of the ADDIE paradigm depend on the context in which ADDIE is being applied. Instructional design centers on individual learning, has immediate and long-range phases, is systematic, and uses a systems approach about knowledge and human learning. Effective instructional design focuses on performing authentic tasks, complex knowledge, and genuine problems. Thus, effective instructional design promotes high fidelity between learning environments and actual work settings. However, instruction should be considered as a potential intervention, only when a lack of knowledge and skills has been validated as the main cause for a performance gap. Thus, ADDIE can be applied when instruction is an appropriate response to a performance discrepancy. Clients and other primary stakeholders should be considered as people for whom you are providing a service. Subject matter experts and other content specialists should be regarded as cooperating partners of the design and development team. The simplicity of the ADDIE concept combined with multiple prompts for inclusiveness continues to prove its

R.M. Branch, *Instructional Design: The ADDIE Approach*,
DOI 10.1007/978-0-387-09506-6_1, © Springer Science+Business Media, LLC 2009

effectiveness. The remainder of the book presents detailed concepts and procedures related to ADDIE as applied to the systematic design of instruction.

Keywords ADDIE · Analyze · Design · Develop · Implement · Evaluate · Instructional design · Subject matter expert · Performance gap · Performance discrepancy

Introduction

ADDIE is an acronym for *Analyze*, *Design, Develop, Implement,* and *Evaluate*. ADDIE is a product development concept. The ADDIE concept is being applied here for constructing performance-based learning. The educational philosophy for this application of ADDIE is that intentional learning should be student centered, innovative, authentic, and inspirational. 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. Because ADDIE is merely a process that serves as a guiding framework for complex situations, it is appropriate for developing educational products and other learning resources. The purpose of this book is to introduce ADDIE as a fundamental process for creating effective learning resources.

This book promotes strategies that move away from didactic, limiting, passive, singular modes of design, and instead move toward designs that facilitate active, multi-functional, situated, inspirational approaches to learning. The goals of this book are to first present the ADDIE concept (Fig. 1), and second, use ADDIE as a way to organize the common procedures associated with instructional design (Fig. 2).

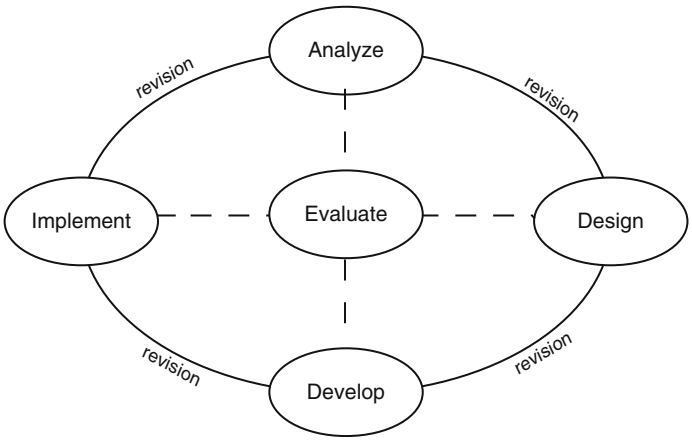


Fig. 1 The ADDIE concept

	Analyze	Design	Develop	Implement	Evaluate
Concept	Identify the probable causes for a performance gap	Verify the desired performances and appropriate testing methods	Generate and validate the learning resources	Prepare the learning environment and engage the students	Assess the quality of the instructional products and processes, both before and after implementation
Common Procedures	1. Validate the performance gap 2. Determine instructional goals 3. Confirm the intended audience 4. Identify required resources 5. Determine potential delivery systems (including cost estimate) 6. Compose a project management plan	7. Conduct a task inventory 8. Compose performance objectives 9. Generate testing strategies 10. Calculate return on investment	11. Generate content 12. Select or develop supporting media 13. Develop guidance for the student 14. Develop guidance for the teacher 15. Conduct formative revisions 16. Conduct a Pilot Test	17. Prepare the teacher 18. Prepare the student	19. Determine evaluation criteria 20. Select evaluation tools 21. Conduct evaluations
	Analysis Summary	*Design Brief*	*Learning Resources*	*Implementation Strategy*	*Evaluation Plan*

Fig. 2 Common instructional design procedures organized by ADDIE

This book promotes an application of learning design that is generative, responsive, and validating. ADDIE is a generative process because it applies concepts and theories to specific contexts. ADDIE is used within educational environments to facilitate the construction of knowledge and skills during episodes of guided learning. Guided learning is the quest for mutually agreed upon expectations between the student and the teacher. While an individual is in a perpetual state of learning, guided learning refers to the construction of knowledge that occurs in shared learning space, physical or otherwise. The fundamental tenet of ADDIE is that all planned activities focus on guiding the student as she or he constructs knowledge in some learning space.

ADDIE adopts an **Input→Process→Output** (IPO) paradigm as a way to complete its phases (Fig. 3). The result of adopting an IPO paradigm is a layered concurrent approach to the ADDIE phases (Fig. 4). The *input* phase reacts to the variables identified in the learning context by accepting data, information, and knowledge. The *process* phase seeks ways to stimulate creative and divergent thinking by utilizing procedures, to interpret, explain, configure, and display multiple approaches to events that are likely to occur in learning

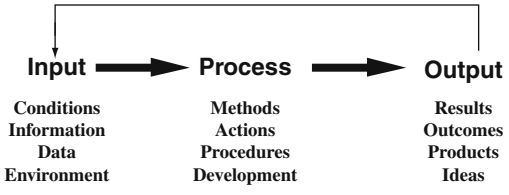


Fig. 3 **Input→Process→Output** (IPO) paradigm

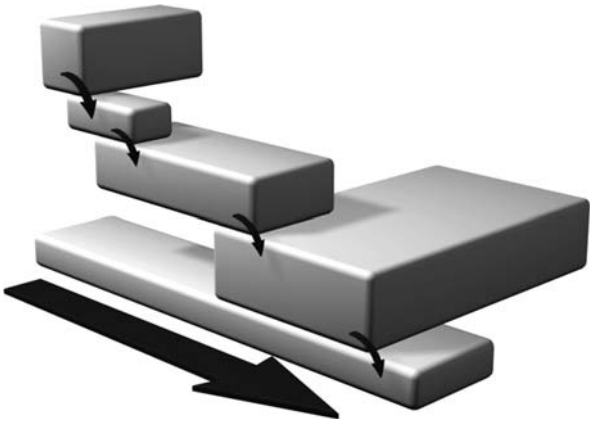


Fig. 4 A concurrent approach to completing the ADDIE phases

space. The *output* phase delivers the results of the process by explicitly presenting ways of knowing that are translated into ways of doing. Each ADDIE phase generates a deliverable that represents the collective thoughts of all the stakeholders. Each deliverable is then tested prior to becoming input for the next phase in the process.

ADDIE is responsive because it accepts whatever goals are established as its orientation. ADDIE is context sensitive, proactive, interactive and is a vehicle for communicating ideas to all stakeholders. Learning needs are initially based on prima facie evidence that a desired performance is not being achieved. Many theories contribute to instructional design such as communication theory, theories related to cognitive psychology, social learning theory, and human development theories. The incorporation of a variety of successful teaching and learning theories allows the ADDIE process to be interdependent, synergistic, dynamic, cybernetic, systematic, and systemic. ADDIE stresses *interdependence* so as to respond to the inextricably connected relationships among pairwise, and otherwise multi-bonded entities joined in learning space. ADDIE is *synergistic* because it presents the sum of the parts as being greater than the whole, thereby increasing the function of each entity beyond its individual value, thus exponentially increasing the probability of achieving the desired goal. ADDIE is *dynamic* in order to respond to the changing variables within learning space. ADDIE is *cybernetic* because it governs, guides, automates, replicates, and prevents failure of the entire process. ADDIE is *systematic* because it establishes rules and procedures, as well as the protocol for establishing the rules and procedures, and helps to constitute responsible approaches to designing instruction. ADDIE is *systemic* because all components of the process respond to any stimulus: or at least have the opportunity to respond to any stimulus.

ADDIE is a validating process because it verifies all products and procedures associated with the development of guided learning episodes. Validation is the guiding trait of ADDIE, and adds credibility through procedures that are analytical, evaluative, and philosophical. Valid paradigms of instructional

design are goal oriented; however, different learning goals require different instructional strategies. Valid learning goals should reflect the reality in which students will be expected to perform, and by doing so, maintain a high degree of congruence between the learning space and the place where actual tasks are performed. A valid instructional design process considers the emotional and instinctive feelings of the student, and the primary participants in the process. The philosophical origin of any instructional design process is important as a way to validate the reasons and motivations of all participants engaged in the process. Validation procedures should be situated, authentic, based on common sense, and account for prominent visceral feelings.

Quantitative and qualitative data should be obtained from all stakeholder groups about the ways in which students learn different kinds of content, and the varying conditions under which learning occurs. Data should be analyzed and summarized into meaningful interpretations so as to make informed decisions about the quality of any materials intended for use during guided learning sessions. Determining the value or specific worth of an ADDIE product requires a process that is inherently evaluative. Evaluation in ADDIE is intended to strengthen a product or procedure, rather than merely ratify an existing way of knowing or an existing way of doing. Evaluation procedures should initiate, permeate, and conclude any ADDIE process so as to afford ample opportunities to intervene during the process for the purpose of improving the product and improving the process as well. Any revisions to the planned instruction should be substantiated with empirical evidence acquired during formative evaluation, thus increasing the validity of the entire process.

ADDIE is not a specific, fully elaborated model in its own right, but rather an umbrella term that refers to a family of models that share a common underlying structure. According to Professor Emeritus Mike Molenda at Indiana University, the ADDIE label seems to have evolved informally through oral tradition rather than a single author as the source of the ADDIE label. Professor Molenda further asserts that ADDIE has become a colloquial term used to describe a systematic approach to instructional development.

Many enterprises that provide corporate and individual training as a commodity currently use ADDIE. Many organizations have incorporated the systematic design of instruction as a part of their corporate plans to compete in their respective markets. ADDIE is commonly used to accomplish educational objectives, particularly as e-learning options are adopted and distance learning via the Internet becomes more popular worldwide.

Learning Space

The purpose of this section is to present a concept called learning space. Learning space is a term used to refer to intentional learning rather than tentional learning. The intent is to demonstrate the need for a system that facilitates the complexities associated with intentional learning.

Emerging philosophies about instruction, education, and theories of learning have re-focused the "classroom" concept to include a broader array of contexts. While classrooms are defined as "a place where classes meet," classrooms are typically shaped by the prevailing societal paradigm and, until recently, classrooms replicated our desire to compartmentalize, consistent with the industrial age. The desire to regiment and control was reflected in classrooms patterned after military models, but classrooms are beginning to reflect a societal shift to an information age.

Classrooms of the information age can be situated at remote sites, accessed at convenient times, and personalized to match the capability of individual learners. While students may still "meet" to study the same subject, the location, time, and pace are now dynamic. Educators and trainers should regard a classroom as any *learning space*. While each episode of guided learning is distinctive and separate, each remains part of a larger curricular scheme. Episodes of intentional learning are characterized by several participating entities which are themselves complex: the learner, the content, the media, the teacher, peers, and the context, all interacting within a discrete period of time while moving toward a common goal.

Student-centered spaces, wherever they are located, represent an epistemological shift from regarding students as the occupants of learning spaces, to regarding the *actions* of students during guided learning as the motivation for the design of instruction. Thus, a clear understanding about the complexities of guided learning is worthy of our initial attention (Fig. 5).

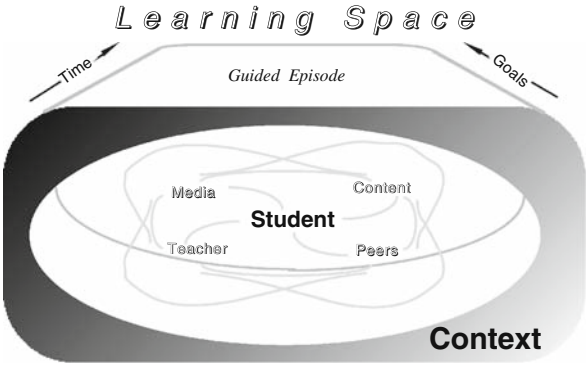


Fig. 5 A visual depiction of the dyadic relationships within intentional learning space

Intentional learning is complex because each of the eight entities is inherently complex. The student is complex because of the physical, emotional, social, and mental development of human beings, and the effect of intelligence, cognitive styles, motivation, cultural norms, creativity, and socio-economic status on behavior patterns. Content is complex because it is a collection of concepts, rules, propositions, procedures, and socially constructed information. Moreover, the information types may be attribute, categorical, classification, component

parts, dimension, elaboration, goal, hierarchical, kinds, matrix, prerequisite, procedural, rule, skills, and type. A peer is a complex entity because of all the social negotiations that occur among persons of the same age, status, or ability. Media are channels of communication that come in a multitude of forms. The teacher or teacher function assumes the executive decision-making role, such as identifying appropriate goals and expectations, analyzing learning needs, arranging content information, choosing media, selecting instructional methods, and conducting assessments on instruction and students. Time is a complex entity because it is omnipresent and can be measured by assigning discrete increments and intervals, but not controlled. Context is the complex entity that refers to those conditions that directly and indirectly influence situations, environments, and communities. Contextual conditions are formed by physical, political, economical, and cultural settings: human ecology. Intentional learning space is the place where educational entities and nonlinear behavior coexist.

Intentional learning prefers goal-oriented strategies rather than incidental-oriented strategies. This goal-oriented nature of intentional learning promotes self-regulatedness in learners. Thus, focusing on intentional learning provides an opportunity for a student to be reflective. Tentional learning results from everyday natural occurrences. While tentional learning can happen in a variety of ways, such as through conversations, observations, impressions and any unintended stimuli that occurs within a context, intentional learning fosters immediate information flow, authentic experiences, and a sense of community. Figure 6 summarizes some of the main differences between tentional learning and intentional learning.

Tentional	Intentional
1. Unplanned	1. Planned
2. Existential	2. Directed
3. Incidental	3. Guided
4. Accidental	4. Purposeful
5. Opportunistic	5. Defined Teacher-Student Roles
6. Informal	6. Formal

Fig. 6 Tentional learning versus intentional learning

Genuine student-centered instruction is typically designed at both macrolevel and microlevel to ensure that every component of the instruction is aligned in a way that facilitates a student's progress from being teacher dependent to becoming teacher independent. Understanding this evolving nature of teacher and student roles is particularly important in order to manage a class in a student-centered manner. A continuum of teacher and student ownership in the student-centered approach is illustrated in Fig. 7.

Because intentional learning is complex, an action learning strategy that features a case-based approach mitigates some of the complexity of intentional

Fig. 7 The changing role across a teacher–student ownership continuum

Practice Environment	Case Level	Context
Guided	Sample	Inside Class
Independent	Practice	
Authentic	Action	Outside Class

Fig. 8 Guiding framework for delivering each instructional episode

learning. Three levels of cases can be used to frame each instructional episode (Fig. 8). Action learning is a strategy that seeks to arrange spaces dedicated to intentional learning in a way that reflects the spaces in which people will actually perform the knowledge and skills that have been learned. The ADDIE paradigm applied to instructional design provides a way to address the complexities associated with learning space.

Principles of Instructional Design

Instructional design centers on individual learning, has immediate and long-range phases, is systematic, and uses a systems approach about knowledge and human learning. Internal conditions premised on a model of information processing should be supported by a deliberately arranged set of external events. Instructional design is an iterative process of planning performance objectives, selecting instructional strategies, choosing media and selecting or creating materials, and evaluation. Types of analysis include needs or front end, instructional (such as content or task), and learner. Other considerations include resources, teacher preparation, and diffusion. Because curricula are usually structured around content rather than human capabilities resulting in gaps between broad goals and specific objectives designers should work backward from desired outcomes of human performance using a taxonomy of learned capabilities to group and sequence objectives, then plan external conditions to support internal conditions for learning.

Individual learning is affected by learner characteristics such as existing knowledge and skills, and memory organization. A schema is an organization of knowledge. Abilities are stable characteristics related to reasoning, spatial orientation, and aptitude. Traits are personality characteristics. Designers should arrange external learning events that support individual learner differences in internal processing.

Performance objectives are specific statements of a learning outcome, or what a learner should be able to do. Objectives have five components: situation, learned capability (verb), object, action, and tools or constraints. The learned capability verb designates the learning outcome and the action designates specifically how this outcome is expressed. Procedural analysis is a flowchart representation of inputs, actions, and decisions necessary to perform a task. Learning-task analysis is a visual representation (instructional curriculum map) of essential and supportive prerequisites of a task. Procedural and learning-task analyses serve to identify the relationships between goals, performance objectives, and enabling objectives.

Gagne's Nine Events of Instruction: gain attention, inform learner, stimulate recall, present information, guide, elicit performance, provide feedback, assess, and enhance are directly related to internal information processing (Gagne, Wager, Golas & Keller, 2005). Depending upon the situation and learners, some events may need to be emphasized or omitted, or may be provided by the learners themselves. However, curricula must be updated to reflect the digital age. Technological innovations can be both beneficial and problematic. While current technologies are beneficial, the use of technology in the future will need to consider the learning situation, expected outcome, environment, the conditions for instructional development, culture, and practicality.

Lesson sequencing is dependent upon the domain of learning outcome. Likewise, the choice of instructional events, materials, and media is dependent upon the domain(s) of the learning objective(s). Teachers should supplement selected materials as necessary to ensure all external conditions are addressed. Instructional designers develop materials with subject matter experts. Student performance is assessed through criterion-referenced test items. The degree of attainment required for the test should match the objective and should be consistent over time. Norm-referenced tests measure performance against "typical" performance enabling comparison of individual performance with a group's performance rather than with a desired learning outcome. Methods of group instruction are dependent upon group size. The precision of the match of the internal and external conditions is inversely proportional to the group size; larger groups require more self-instruction. Instructional designers should attempt to identify strategies to replicate tutoring conditions in small and large group learning environments. The Internet provides for online learning technologies to support teaching and learning strategies. New capabilities are provided to instructional designers via individualization, collaboration, testing, and learning management systems. Blended learning and better

feedback opportunities, in worldwide venues, are online learning strengths. Learning objectives remain the focus of the online learning.

The role of evaluation in instructional design is paramount. Evaluation, within the context of instructional design, should answer questions about student performance as well as the worth and unintended effects of any planned instruction. Evaluation as an instructional design concept initiates the ADDIE process, permeates the ADDIE process, and concludes the ADDIE process and is expressed in terms of gap analysis, which starts the ADDIE process, formative evaluation which occurs during the development middle phases of ADDIE, and summative evaluation which ends the ADDIE process.

Instructional design is a systematic process that is employed to develop education and training programs in a consistent and reliable fashion. However, instructional design is a complex process that is creative, active, and interactive. ADDIE illustrates the conceptual components of instructional design. Instructional design models indicate how to practice instructional design. Instructional design models allow people to visualize the overall process and establish guidelines for managing instructional design processes. Instructional design provides a means for communicating among team members, clients, and stakeholders.

Instructional design is characterized as learner centered, goal oriented, focusing on meaningful performance, assuming that outcomes can be measured, procedures are based on empirical evidence, interactive, self-correcting, and typically a team effort. Therefore, students and their performance are the focal point of the principles of instructional design. Teaching is a means to facilitate student performance. Students actively participate in determining objectives, instructional methods, and goals. Goals are central to the principles of instructional design and should reflect the expectations of the primary stakeholders, such as the students, teachers, and clients. Goals also help maintain focus on meaningful performance throughout the ADDIE process and avoid tasks that are trivial, contrived, and over-simplified.

Effective instructional design focuses on performing authentic tasks, complex knowledge, and genuine problems. The contention is that intentional learning is effective when educational strategies use processes that move a student through learning space that approaches congruency with a corresponding performance space. The ADDIE process facilitates the ability of intentional learning modules to progress the student while increasing the fidelity between the learning space and the performance space (Fig. 9), thereby increasing the potential for success. Thus, effective instructional design promotes high fidelity between learning environments and actual work settings. High fidelity between learning and work environments is accomplished by instructional design through emphasis on measurable outcomes. Assessment instruments dedicated to the instructional design process should be reliable and valid. The principles of instructional design remain somewhat dynamic due to many advances in learning theory, multimedia capabilities, learning management systems, and competencies development for instructional designers.

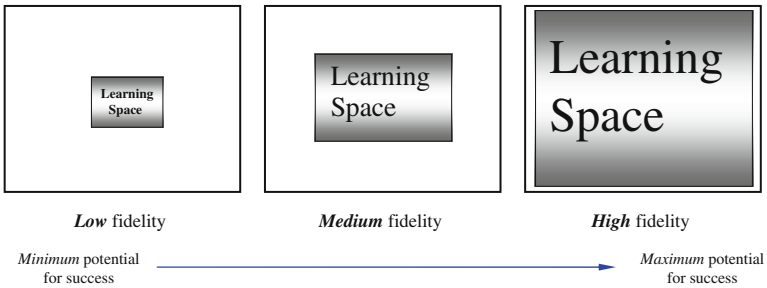


Fig. 9 Effective instruction systematically increases the fidelity

The Systems Concept

A system facilitates the complexities of a context by responding to multiple situations, interactions within context, and interactions between contexts. The general systems concept is characterized as systematic, following rules and procedures, systemic, responsive, interdependent, redundant, dynamic, cybernetic, synergistic, and creative. A systems approach accepts whatever goals are established as its orientation. Different learning outcomes often require various applications to the fundamental concept; however, the primary components are retained so as to maintain the integrity of the original concept. Figure 10 illustrates an example of an application model of the systems approach to instructional design.

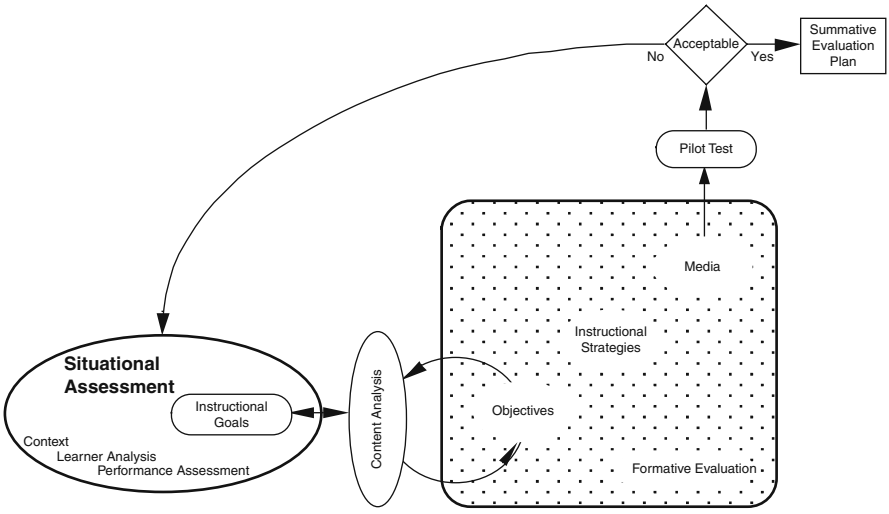


Fig. 10 An application model of a systems approach to instructional design

Instructional Systems Design, as the name implies, is a systems approach. As a single component of a system changes, other components in the system also change. Let's say, for example, that you're developing training for pilots on the 777 aircraft. If they are experienced on the 727 aircraft, you prepare your training one way. If the participant group changes and you learn that it consists of *novice* pilots, you would prepare the training yet a different way. Therefore, if you have a good understanding of a process, conceptually, you can make better decisions when applying the process in various situations.

Another example is that if you understand the process of baking cookies, then whether you make chocolate chip or raisin oatmeal cookies, you can better apply the process and get good results. Using an Instructional Systems Design process that is both conceptual and an application process means that different groups will apply the process differently although the fundamental components of the process remain the same. A recipe will call for certain ingredients and while all ingredients are used, the amounts of each ingredient may vary depending on other factors.

Applying the systems approach to instructional design allows the instructional design process to be both descriptive and prescriptive. Instructional systems design is descriptive because it shows relationships, indicates sequences that occur during the creative process, fosters interactivity, explains, describes phenomena, highlights if–then (conditional) statements, allows passivity where appropriate, and offers fertile ground for conceiving instructional design and development models. Instructional systems design is prescriptive because it assigns rules and guidelines for achieving an outcome, identifies models, methods and procedures, and strategies necessary to achieve those outcomes, provides instructions to get a desired effect, is goal oriented, active, and utilize applied models of practice.

Instructional systems design provides opportunities to plan situated approaches to learning. Utilizing general systems theory facilitates systematic planning in terms of human diversity and in terms of curriculum variables particularly where success is measured in terms of learner achievement. A systems approach can be applied to developing instruction, but care should be given to remain focused on principles of instructional design. ADDIE merely represents a fundamental concept for guiding the instructional systems design process. Effective instructional design systems require a partnering process. While applying a systems approach to instructional design can be construed as constricting and stifling, exactly the opposite should be true where the true practice of instructional systems design yields inspirational episodes of intentional learning based on common sense.

A Partnering Process

Many requests to develop instruction are unnecessary. While instruction can influence the performance of an individual, there are many other factors that also influence performance, some of which have nothing to do with complete

instructional modules. Alternatives to complete instructional modules include, but are not limited to information, documentation, job aid, feedback, permission, reengineering, reorganization, and consequence.

An example of information as an alternative to instruction is when an employee might not perform because the manager never communicated relevant information to the employee. As soon as the employee was informed, the performance gap was closed. An example of documentation as an alternative to instruction occurs when it is possible that the written process the employee was to follow is faulty, not the person. As soon as the documentation was improved, the performance gap was closed. An example of reengineering as an alternative to instruction is when a piece of equipment has been deemed faulty rather than any fault being found with the employee operating the equipment. As soon as the equipment was reengineered, the performance gap was closed. An example of a job aid as an alternative to instruction is when details for a task that's performed rarely and is readily available to the employee when needed would be a better solution than a full training program. As soon as a job aid with the essential, but rarely used detail, is available just-in-time for the employee's use, the performance gap is closed. An example of feedback as an alternative to instruction occurs when an employee has no feedback on how he or she is performing, and then he or she may not perform a job when necessary, or may perform the job inadequately. As soon as the employee is provided with feedback about ways his or her performance could be improved, the employee complied and the performance gap was closed. An example of permission as an alternative instruction occurs when an employee doesn't think he or she has permission to do a task, and therefore doesn't perform even when he or she has the knowledge and skill to complete the job. As soon as the employee is clear that he or she is actually authorized to complete the task in question, the performance gap is closed. An example of reorganization as an alternative to instruction is when an employee is placed within one business unit, but reports to another business unit. As soon as the employee is moved into the correct business unit, the employee performs his or her job properly and the performance gap is closed. An example of consequence as an alternative to instruction occurs when there are no consequences for doing a job wrong. Even if the person is trained, he or she may continue to do the job incorrectly because he or she perceives that it doesn't make any difference whether or not the job is done correctly. As soon as the employee fully understands the impact of his or her actions, the employee immediately improves and the performance gap is closed.

Instruction is appropriate only when the competency of the individual can be increased through improved knowledge or skills. An individual's performance should be presented in terms of his or her actual performance compared to his or her desired performance. The difference between the actual performance and the desired performance is referred to as *Performance Discrepancy*. There are three general categories of reasons why a performance discrepancy exists: (1) limited resources, (2) lack of motivation, and (3) lack of knowledge and skill.

Limited resources (not allowed) as a cause for a performance gap is explained by an employee knowing how to perform a task and is willing to perform the task, but because of limited resources, the employee isn't allowed to perform. An example of poor performance primarily caused by limited resources is when an employee knows how to use a computer program to perform his or her job responsibilities, but because of user volume, the computer system is down 30% of the time. The gap in performance in this case is caused by lack of resources. Lack of motivation (don't want to) is explained by an employee knowing how to perform but doesn't want to. An example of poor performance primarily caused by lack of motivation is when an employee knows how to complete a form correctly, but no one ever seems to notice if he or she completes it correctly or not. Therefore the employee is not motivated to complete the form with 100% accuracy. The gap in this case is caused by lack of motivation. Lack of knowledge and skills (don't know how) is explained by an employee having the resources to complete a job, and motivated to complete the job, but doesn't know how to complete the job (or doesn't know how to do the job well). An example of poor performance primarily caused by lack of knowledge and skill is when an employee is interested in completing a form correctly, but has not learned how. The gap in this case is caused by lack of knowledge and skill.

Thus, the purpose of instruction is to close the gap in performance when it is caused by a lack of knowledge or skill. Alternatives to instruction should be considered when a performance gap is primarily caused by lack of resources or lack of motivation. Figure 11 presents a scenario where alternatives to instruction should be considered for closing a performance gap. Figure 12 presents a scenario where instruction is probably a feasible approach to closing a performance gap. Figure 13 presents a scenario where additional information should be obtained prior to determining the primary causes for a performance gap.

A beverage company wants to improve the positioning of its beverage containers on retail shelves. Beverage route personnel have been asked to incorporate the task of straightening the containers on the shelves when delivering merchandise according to known guidelines that take consumer behavior into consideration. (The methods stay within the limits of the beverage company's contract with the retail establishments.) Two months after the task was assigned, results show that positioning in retail establishments has not improved. A focus group of route personnel has indicated that: 1) Time at retail sites is too short to accomplish the task, and 2) Delivery personnel's income is based on the quantity of beverages delivered. Management is requesting training for all delivery personnel regarding this issue.

Fig. 11 Scenario of alternative to instruction is appropriate

An urban school district is instituting single new software application that links the existing software systems that are currently utilized throughout the district, which includes such procedures as purchasing, payroll, benefits, and accounting. Training for Accounting Department personnel is scheduled to begin next month.

Fig. 12 Scenario where instruction is probably feasible

All line operators at XYZ Manufacturing Company are issued protective eyewear (safety glasses) and directed to wear the issued eyewear at all times when on the manufacturing "floor." The Safety Manager has observed low compliance with the company's directive and has requested safety training for all line operators.

Fig. 13 Scenario where additional information is warranted

The success of an instructional effort often depends on the design team's ability to work well with the client or primary stakeholders in the instructional development process. The actions of an instructional design team should focus on strategies that can help develop positive stakeholder interactions. Consider the three cases presented in Figs. 14, 15 and 16 that describe typical "problem" client–designer interactions.

You've facilitated the pilot test for the class you recently designed for Technology Coordinators. You had worked extremely hard under tight deadlines to meet the training schedule. Upon completion of the pilot test you were feeling very proud of your work. You then began reading the class evaluations, and were surprised. Each evaluation said essentially the same thing: the course was a 'waste of time,' 'too slow,' 'things we already knew.' You're devastated. How could that happen? The client said that the learners would be new to the job.

Fig. 14 Case where designers over-relied on client information

Client: "The designer on this project is just impossible. He just wants to be creative, and continues to come up with new ideas at each development session, and just isn't getting down to work. I wish he'd get on with it and stop taking up my time with more "fantastic ideas" to consider. I don't care about the details; I just want him to do his job."

Designer: "The client on this project is just impossible. She has no imagination at all. I give her lots of alternatives, which represents some of the best work I've ever done, and she doesn't even respond. I could give her junk and she wouldn't know the difference. She's so narrow-minded; she doesn't have a creative bone in her body. I can't figure out how she got where she is."

Fig. 15 Case where the designer and the client failed to establish scope

Client: "Where did you get the idea that we had 2 days for training? We've always talked about a one-day class."

Designer: "I had 2 days written down in my notes."

Client: "(Pointing to an exercise) And this learning exercise" how are you going to do that with 40 people in the class?"

Designer: "Excuse me but I was told that there would be no more than 25."

Client: "(More heatedly) That's not what we discussed. (Disappointedly) I depended on you."

Designer: "I'll have to rework it."

Client: "The whole thing will need to be reworked."

Designer leaves thinking, "Why can't he stay consistent?"

Fig. 16 Case where the designer failed to send confirmation statements

Subject Matter Experts (SMEs) are important resources during the Instructional Design Process. They have the expertise and content knowledge that the designer must acquire in order to construct the content of an instructional module and make it relevant to the student. High-quality instruction almost always

depends on input from subject matter experts. However, the subject matter expert should be considered as a "*partner*" in the ADDIE process. The first step in defining strategies that can transform subject matter experts into ADDIE partners is to make the concerns of the subject matter expert a high priority. Subject matter experts become partners in the instructional design process when they are confident and assured that everyone in the ADDIE process understands the value of their time, the importance of accurately representing their ideas in any finished learning product and their contributions are properly acknowledged.

ADDIE: An Overview

Analyze, Design, Develop, Implement, and Evaluate (ADDIE) describes a process applied to instructional design in order to generate episodes of intentional learning. This section presents an overview of the purpose, procedures, and deliverables commonly associated with each of the five ADDIE phases.

The purpose of the *Analyze* phase is to identify the probable causes for a performance gap (see Fig. 17). The main procedures often associated with the Analyze phase are validate the performance gap, determine instructional goals, confirm the intended audience, identify resources required to complete the entire ADDIE process, determine potential delivery systems (including cost estimates), and compose a project management plan. The typical deliverable for the Analyze phase is an *Analysis Summary*.

The purpose of the *Design* phase is to verify the desired performances and appropriate testing methods. The main procedures often associated with the Design phase are as follows: conduct a task inventory, compose performance

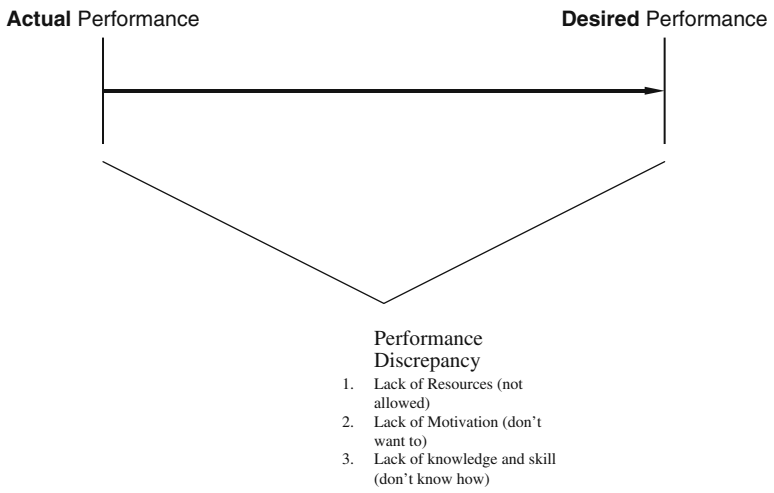


Fig. 17 Depiction of gap analysis concept

objectives, generate testing strategies, and calculate return on investment. The typical deliverable for the Design phase is a *Design Brief*.

The purpose of the *Develop* phase is to generate and validate the learning resources that will be required during the life of the instructional modules. The main procedures often associated with the Develop phase are as follows: generate the content, select supporting media that already exist or develop supporting media for the expressed purpose of this project, develop guidance for the teacher, develop guidance for the student, conduct formative revisions, and conduct a pilot test. The typical deliverable for the Develop phase are all of the *Learning Resources* for the entire ADDIE process.

The purpose of the *Implement* phase is to prepare the learning environment and engage the students. The main procedures often associated with the Implement phase are preparing the teacher and preparing the student. The typical deliverable for the Implement phase is an *Implementation Strategy*.

The purpose of the *Evaluate* phase is to assess the quality of the instructional products and processes, both before and after implementation. The main procedures often associated with the Evaluate phase are as follows: determine the evaluation criteria for all aspects of the ADDIE process, select or create all of the evaluation tools that will be required to complete the entire ADDIE process, and conduct evaluations. The typical deliverable for the Evaluate phase is an *Evaluation Plan*.

An effective way to judge your understanding of the ADDIE concept is to practice by renaming each of the five components in the ADDIE process using a different word or different phrase than the words *Analyze, Design, Develop, Implement,* and *Evaluate*. Consider a substitute word or phrase for Analyze. Consider a substitute word or phrase for Design. Consider a substitute word or phrase for Develop. Consider a substitute word or phrase for Implement. Consider a substitute word or phrase for Evaluate. Then, consider creating your own graphic to illustrate *your* new ADDIE process.

Organization of the Book

The following five chapters represent each of the five ADDIE phases. While there are certainly variations to the ADDIE paradigm presented in this book, practically all known instructional design processes based on a systems approach use a similar development process. Each chapter is framed by the common procedures that typically characterize a particular ADDIE phase (see Fig. 2). There is no single correct set of ADDIE procedures or no single correct sequence of ADDIE procedures. The procedures associated with each phase of ADDIE, and their sequence, will vary depending on the designer's perspective, the backgrounds of the design team members, and the peculiarities of the context in which the ADDIE paradigm is being applied.

Each of the 21 ADDIE procedures presented in this book is organized as a lesson plan comprised of the following sections:

- Objective
- You Should Already Know
- Content
- Practice Opportunity
- Closure

The 21 ADDIE procedures adopt a lesson plan format to facilitate those who may intend to use this book as a course text for teaching the introduction to instructional design.

A case-based approach is used as the guiding framework for delivering each instructional episode (see Fig. 8). The series of cases can be categorized as *beginning cases, middle cases,* and *ending cases*. *Beginning cases* are characterized by well-defined problems, simple situations, familiar contexts, prerequisite knowledge already possessed by the students, the desired outcome being evident, solution being derived in a relatively short time period, a lot of involvement of the facilitator, and the presentation of one best solution. *Middle cases* are characterized by a somewhat well-defined problem, a relatively simple solution, a somewhat familiar context, prerequisite knowledge already possessed by the student, or easy to acquire necessary prerequisite knowledge to process the case, the desired outcome is revealed early in the problem-solving process, a solution is always possible, a collaborative effort between the teacher and the student, and multiple, but relatively few, solutions are evident. *Ending cases* are characterized by ill-defined problems, relatively complex situations, unfamiliar context, students will likely need to acquire some prerequisite knowledge and skills, the desired outcome is negotiated,

Action Learning Lesson Plan	
1. Gain Attention	Actual instance from performance space
2. Clarify Expectations	Explain what the student has to accomplish (objectives)
3. Review	Students share existing knowledge & skills
4. Present the Content	Concept, theory and application
5. Guided Practice	***Sample*** case (Beginning)
6. Independent Practice	***Practice*** case (Middle)
7. Share New Knowledge	Community assessment & feedback
8. Implementation	Plan to use new knowledge & skills
9. Closure	***Action*** case (End)

Fig. 18 An adaptation of Gagne's nine events of instruction to an action learning format

conducted in real time, student(s) takes the lead and typically a variety of solutions are appropriate with different sets of consequences for each solution. An effective lesson plan based on action learning will include all three types of cases.

Strategies dedicated to facilitating learning are based on the concept that patterns can be established to explain the way humans interact with the environment. Certain psychological conditions need to exist in order for various types of learning to occur. Gagne's nine events of instruction *(adapted from Gagne, Wager, Golas & Keller, 2005)* define sequence of learning activities so as to organize each lesson plan (Fig. 18). The action learning lesson plan provides a framework in which the beginning, middle, and ending cases can be strategically located.

Summary

ADDIE is an acronym for *Analyze, Design, Develop, Implement,* and *Evaluate*. ADDIE is a product development paradigm and not a model per se. The ADDIE concept is being applied here for constructing performance-based episodes designated for learning space. Learning space is the term used to refer to intentional learning environments rather than tentional learning that occurs all the time. Intentional learning environments are complex and ADDIE provides a way to navigate the complexities associated with developing modules for use within intentional learning environments. The application of ADDIE to instructional systems design facilitates the complexities of intentional learning environments by responding to multiple situations, interactions within context, and interactions between contexts. Yet, the fundamental ADDIE components remain the same throughout various applications and variations of the ADDIE paradigm depend on the context in which ADDIE is being applied.

Instructional design centers on individual learning has immediate and long-range phases, is systematic, and uses a systems approach about knowledge and human learning. Effective instructional design focuses on performing authentic tasks, complex knowledge, and genuine problems. Thus, effective instructional design promotes high fidelity between learning environments and actual work settings. However, instruction should be considered as a potential intervention, only when a lack of knowledge and skills has been validated as the main cause for a performance gap. Thus, ADDIE can be applied when instruction is an appropriate response to a performance discrepancy.

Clients and other primary stakeholders should be considered as people for whom you are providing a service. Subject matter experts and other content specialists should be regarded as cooperating partners of the design and development team. The simplicity of the ADDIE concept combined with multiple prompts for inclusiveness continues to prove its effectiveness. The remainder of this book presents detailed concepts and procedures related to ADDIE as applied to the systematic design of instruction.

	Analyze	Design	Develop	Implement	Evaluate
Concept	Identify the probable causes for a performance gap	Verify the desired performances and appropriate testing methods	Generate and validate the learning resources	Prepare the learning environment and engage the students	Assess the quality of the instructional products and processes, both before and after implementation
Common Procedures	1. Validate the performance gap 2. Determine instructional goals 3. Confirm the intended audience 4. Identify required resources 5. Determine potential delivery systems (including cost estimate) 6. Compose a project management plan	7. Conduct a task inventory 8. Compose performance objectives 9. Generate testing strategies 10. Calculate return on investment	11. Generate content 12. Select or develop supporting media 13. Develop guidance for the student 14. Develop guidance for the teacher 15. Conduct formative revisions 16. Conduct a Pilot Test	17. Prepare the teacher 18. Prepare the student	19. Determine evaluation criteria 20. Select evaluation tools 21. Conduct evaluations
	Analysis Summary	***Design Brief***	***Learning Resources***	***Implementation Strategy***	***Evaluation Plan***

Chapter 1
Analyze

Contents

Abstract The purpose of the Analyze phase is to identify the probable causes for a performance gap. Upon completion of the Analyze phase, you should be able to determine *if* instruction will close the performance gap, propose degree to which instruction will close the gap, and recommend strategies to close the performance gap based on empirical evidence about the potential for success. While instruction can influence the performance of students, employees, and other learners, there are many other factors that influence performance and become valid alternatives to instruction, such as filling an information void, providing appropriate documentation, crafting effective job aids, providing timely feedback, delegating authority, reengineering a product or process, reorganizing a work unit, and clarifying consequences of poor performance; therefore, if the performance gap is caused by reasons other than a lack of knowledge and skill, then *stop* the ADDIE process. If the performance gap is caused by a lack of knowledge and skill, then proceed to propose instructional options. During the client meeting where the Analysis Summary is delivered, usually one of two things happen: (A) the client requests changes to the analysis or (B) the client is satisfied. If the client request changes, repeat the Analyze phase or relevant parts of the Analysis phase and prepare a revised Analysis Summary document.

Keywords Analyze · Analysis · Performance assessment · Performance gap · Client · Instruction · Instructional design

R.M. Branch, *Instructional Design: The ADDIE Approach*,
DOI 10.1007/978-0-387-09506-6_2, © Springer Science+Business Media, LLC 2009

Introduction to Analyze Phase

The purpose of the Analyze phase is to identify the probable causes for a performance gap. The common procedures associated with the Analyze phase are as follows:

1. Validate the Performance Gap
2. Determine Instructional Goals
3. Analyze Learners
4. Audit Available Resources
5. Recommend Potential Delivery Systems (including cost estimates)
6. Compose a Project Management Plan

Upon completion of the Analyze phase, you should be able to

a. Determine *if* instruction will close the performance gap
b. Propose degree to which instruction will close the gap
c. Recommend strategies to close the performance gap based on empirical evidence about the potential for success

If the performance gap is caused by reasons other than a lack of knowledge and skill, then *stop* the ADDIE process. While instruction can influence the performance of students, employees, and other learners, there are many other factors that influence performance and become valid alternatives to instruction, such as filling an information void, providing appropriate documentation, crafting effective job aids, providing timely feedback, delegating authority, reengineering a product or process, reorganizing a work unit, and clarifying consequences of poor performance. An example of filling an information void is when an employee might not perform because the manager never communicated relevant information to the employee. An example of providing appropriate documentation occurs when the written process the employee was to follow was faulty, not the person. We need to change the written process and not train the person to get the desired results. An example of crafting effective job aids is that when a task that is performed rarely and is readily available to the employee when needed would be a better solution than a full training program. An example of providing timely feedback is if an employee has no feedback on how he or she is performing, then he or she may not perform a job when necessary, or may perform the job inadequately. Giving the employee proper feedback may produce the desired results. An example of delegating authority is that the employee does not think he has permission to do the task and therefore doesn't perform even when he or she has the skill to complete the job. An example of reengineering a product or process may be the setup of the work unit interfering with performance. Training won't solve this situation. An example of reorganizing a work unit is when an employee placed within one business unit, but reporting to another business unit will likely perform his or her job properly once moved into the correct business unit. An example of clarifying consequences of poor performance occurs if there

is no consequence for doing the job wrong. Even if the person is trained, he or she may continue to do the job incorrectly because he or she perceives that it doesn't make any difference whether or not the job is done correctly.

If the performance gap is caused by a lack of knowledge and skill, then proceed to propose instructional options and develop a *Purpose Statement*. The result of this phase is an Analysis Summary. Common components of an Analysis Summary are as follows:

1. Performance Assessment
2. Purpose Statement
3. List of Instructional Goals
4. Learner Analysis
5. Required Resources
6. Potential Delivery Systems (including cost estimates)
7. Project Management Plan

During the client meeting where the Analysis Summary is delivered, usually one of two things happen: (A) the client requests changes to the analysis or (B) the client is satisfied. If the client request changes, repeat the Analyze phase or relevant parts of the Analysis phase and prepare a revised Analysis Summary document. If the client is satisfied, then obtain the appropriate endorsements and proceed to the Design Phase. The remainder of this chapter is devoted to the common procedures of the Analyze phase.

Validate the Performance Gap

Objective Generate a purpose statement based on a defined performance gap.

You Should Already Know The concepts associated with each of the five ADDIE phases.

Content Instructional designers are often requested to develop instruction for knowledge people already possess or skills people can already perform. The purpose of instructional design is to generate instruction where a lack of knowledge and skill exists. Therefore, the initial step in the instructional design process is to analyze the reasons for a performance gap. A Performance Assessment reveals the reasons or causes for performance gaps.

Sample Performance Discrepancies

A. A computer program upgrade with a new user interface has just been installed in the work place. There is a

significant decrease in productivity. Therefore, a performance discrepancy exists.

B. A hybrid automobile has been added to the fleet of vehicles at the university. The automotive technicians at the university responsible for the proper functioning of the new hybrid vehicles have never maintained or repaired the new cars. Therefore, a discrepancy exists between the auto technician's current skills with maintaining the older gasoline only cars and the knowledge and skills required for maintaining the newer hybrid cars. Therefore, a performance discrepancy exists.
C. Multiple errors have been found in the Accounting Department's handling of paychecks. Therefore, a performance discrepancy exists.

The three main steps for conducting a performance assessment are

1. measure the Actual Performance
2. confirm the Desired Performance
3. identify the causes for the performance gap

Step 1. Measure the Actual Performance

A. Observe
B. Test
C. Interview

   i. top performers
   ii. subject matter experts
   iii. novice performers
   iv. supervisors

D. Gather data from

   i. standards
   ii. surveys
   iii. occurrence reports
   iv. error reports
   v. awards and recognition criteria

Step 2. Confirm the Desired Performance

A. Observe
E. Test
F. Interview

   i. top performers
   ii. subject matter experts
   iii. novice performers
   iv. supervisors

G. Gather data from

i. standards
ii. surveys
iii. occurrence reports
iv. error reports
v. awards and recognition criteria

Step 3. Identify the Causes for the Performance Gap

Once the extent of the Performance Gap has been determined, the next step is to identify the primary cause of the gap. Practically all causes for a performance discrepancy can be categorized as one of the following:

A. Lack of Resources
B. Lack of Motivation
C. Lack of Knowledge and Skill
(see Fig. 1.1)

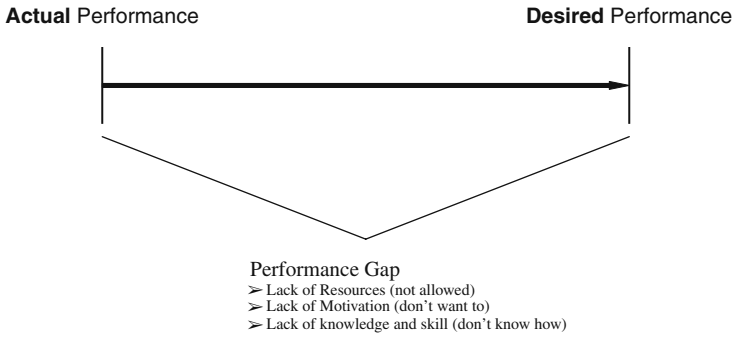


Fig. 1.1 Three main causes for a performance gap

1. **Lack of Resources** (not allowed)
   Performance gaps caused by a lack of resources indicate that someone is motivated to perform the desired task, but the resources are unavailable to perform the desired tasks. Lack of resources are commonly associated with:
   Limited Technology Capacity (Insufficient support)
   The person could do the work if he or she had the resources available, such as knowing how to complete a desired computer task, but the person can't accomplish the desired performance because he or she doesn't have access to a computer.

Limited Cognitive Capacity (Not able)
The person is not capable of performing the work no matter how much training he or she receives, such as an excellent student who continues to fail quantum physics, regardless of the effort.

Limited Process Capacity (Doesn't work)
The process that the person is following to complete the task is flawed, such as requiring a person to follow a set of procedures that omit necessary components of the process. Thus, increasing capacity may be the best response to a performance gap in the case of lack of resources, rather than instruction.

2. **Lack of Motivation** (don't want to)
Performance discrepancies caused by a lack of motivation indicate someone has the capacity to perform the desired task, but chooses otherwise. The person is "unwilling" to perform the task. There can be several reasons for apparent lack of motivation, for example

   a. a media specialist may not have received clear expectations about the need for the task
   b. a student may not have received feedback or coaching from his or her teacher
   c. a teacher might be told to perform a task but received greater financial incentives for performing other tasks instead
   d. an individual may have been punished for a previous performance, such as being the only manager who saves thousands of dollars in his budget and becomes the only one who gets his budget reduced the following year
   e. an employee may have never received communication about the need for the task, although he or she could perform the task to the desired level if he or she was aware of the need

   Thus, motivating an individual to perform desired tasks might be the best response to a performance gap in the case of lack of motivation, rather than instruction.

3. **Lack of Knowledge and Skill** (Don't Know How)
Performance gaps caused by a lack of knowledge and skill indicate an individual has the resources to perform the desired task and the individual is willing to perform the desired task; however, the intellectual skill or psychomotor skill to perform as desired is not evident. Thus, instruction may be the best response to a

performance gap in the case of lack of knowledge and skill. The results of a performance assessment typically indicate that the performance gap has multiple causes. This may require a need to modify the original scope of the performance gap or several non-instructional responses are more appropriate than invoking the ADDIE paradigm. Often, there will be a need for multiple responses to a performance gap, and those responses may need to occur simultaneously.

Sample Performance Assessment

The Maintenance Services Division of Big Box Stores, a national retail business solicited bids for a training development project. An instructional design group responded to the request for proposals. The training request indicated several instances of intermittent malfunctioning store escalators causing minor injuries to store patrons. The team conducted a performance analysis. The team interviewed stakeholders from all levels of the company. A total of 80 people participated in the performance analysis. The results of the 80 people surveyed and review of company records are presented in the following Performance Assessment chart (Fig. 1.2).

Actual Performance	*Desired Performance*	*Primary Cause*	*Percent of the Performance Gap*
31% identified and located the proper service entry panels	Identify and locate all service entry panels on all models of escalators	1. Rarely informed about part recalls 2. Unclear about personnel responsible for managing procedural updates 3. Spanish is the preferred language of communication for the majority of the maintenance staff	20%
34% identified when to move an escalator to "out-of-service" status even when it appears to be functioning properly	Move escalator to "out of service" before there is a potential for injury due to improper operation	1. Rarely is preventative maintenance performed	30%
21% identified the correct procedures to identify warning signs of potential malfunction	Anticipate malfunctions	1. Unaware of expenses associated with malfunctioning escalator that led to personal injury 2. No one assesses performance prior to the malfunction of an escalator	25%

Fig. 1.2 Sample performance assessment chart

87% failed to correctly identify the procedure for anticipating a malfunction, properly move to "out of service," perform proper service and return to safe service	Anticipate a malfunction, properly move to "out of service," perform proper service, and return to safe service	1. Posted information is often inconsistent with the actual escalator mechanism 2. Maintenance personnel are often trained on escalators that are different from the actual escalators encountered on the job	25%
			Total = 100%
Purpose Statement	The purpose of this training program is to present effective strategies for the safe and efficient maintenance of the escalators at Big Box Stores		

Fig. 1.2 (continued)

Practice Opportunity Compose a preliminary draft of a performance assessment (Fig. 1.3) for the Firefighter Case located in Appendix A.

Performance Assessment

Actual Performance	Desired Performance	Primary Cause	% of Total Performance Gap
Purpose Statement			

Fig. 1.3 Performance assessment summary template

Purpose Statement

The Validate the Performance Gap procedure is summarized in a *Purpose Statement*. The purpose of the *Purpose Statement* is to state in succinct and explicit terms the primary function of

the instructional program and the context in which the instruction will occur. Develop a *Purpose Statement* after you have determined that instruction is a viable option for closing a portion of the performance discrepancy.

Guidelines for Composing a Purpose Statement

1. Expressed in terms of what the teacher function will accomplish.
2. Use plain language rather than jargon. A client or non-training professional ought to comprehend the overall goal of the proposed instruction.
3. Show the connection between the instruction and the business need for the training.
4. Limited to 25 words. More details about the context or situation can follow in subsequent content as part of an introduction.

Practice Opportunity Write a *Purpose Statement* for the *Firefighter Case* located in Appendix A.

_____

_____

_____

Closure Support recommendations with empirical evidence. Consider the different types of learning that will be needed to achieve the purpose.

Determine Instructional Goals

Objective Generate goals that respond to performance gaps that are caused by a lack of knowledge and skill.

You Should Already Know The three most common causes of a performance gap.

Content A goal is defined as the end toward which all effort is directed. A description of a broad expectation. There are many origins for goals. However, goals should be statements rather than questions in the ADDIE approach to instructional design. Effective goals are the result of a shared decision-making

process, situated within some context, a reflection of some reality, valid and authentic. Sample goal statements are the following:

a. Write a novel
b. Travel to another country
c. Generate collaborative living environments
d. Get married
e. Build a house

Instructional goals describe the "terminal" tasks that students will perform at the end of the course. They answer the question, "What will students be able to do as a result of participating in this course?" While goals infer performance, they *do not* specify the criteria (standards) for the performance nor the conditions under which the performance should be demonstrated.

Here are some examples of instructional goals:

a. "Identify the essential components of guided learning."
b. "Compose a research report worthy of publication."
c. "Apply an interactive planning process to the development of learning resources."
d. "Analyze learning."
e. "Synthesize a proposal to develop instruction."
f. "Evaluate learning resources and development processes."

Most learning requires a progression from known to unknown, and from simple to complex. Learning is also organized by cognitive domains such as Bloom's Taxonomy (Fig. 1.4). Indeed, the learner would need to remember information (have basic *knowledge*), interpret information or predict consequences or effects (*comprehend* information), use learned material in new and concrete situations (*apply* the rules, methods, concepts, principles, laws, or theories), see the parts of a situation and the patterns that have been formed (*analyze*, separate, and explain the meanings), put parts together to form a new whole (such as *synthesize* a research proposal), judge the value of material for a given purpose (*evaluate* a statement, novel, research report, training project).

Bloom's Taxonomy

Competence	Skills Demonstrated
Knowledge	• Observation and recall of information • Knowledge of dates, events, places • Knowledge of major ideas • Mastery of subject matter *Question Cues*: list, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where, etc.
Comprehension	• Understanding information • Grasp meaning • Translate knowledge into new context • Interpret facts, compare, contrast • Order, group, infer causes • Predict consequences *Question Cues*: summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend
Application	• Use information • Use methods, concepts, theories in new situations • Solve problems using required skills or knowledge *Question Cues:* apply, demonstrate, calculate, c omplete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover
Analysis	• Seeing patterns • Organization of parts • Recognition of hidden meanings • Identification of components *Question Cues:* analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, explain, infer

Fig. 1.4 Adapted from Bloom, B.S. (Ed.) (1956) Taxonomy of educational objectives: The classification of educational goals: Handbook I, cognitive domain. New York; Toronto: Longmans, Green

Synthesis	• Use old ideas to create new ones • Generalize from given facts • Relate knowledge from several areas • Predict, draw conclusions *Question Cues:* combine, integrate, modify, rearrange, substitute, plan, create, design, invent, what if?, compose, formulate, prepare, generalize, rewrite
Evaluation	• Compare and discriminate between ideas • Assess value of theories, presentations • Make choices based on reasoned argume nt • Verify value of evidence • Recognize subjectivity *Question Cues:* assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate,support, conclude, compare, summarize

Fig. 1.4 (continued)

Please be advised that there will be a desire to use words to generate goal statements that are practically impossible to measure, but seem intuitive such as "know," "understand," and "know." However, avoid these and similar words in performance-based learning environments (Fig. 1.5). Instructional Goals are valuable for describing the training project to the client during the Analysis Summary. Because instructional goals can be sequenced, they are also used in the Design phase to organize the remainder of the ADDIE process.

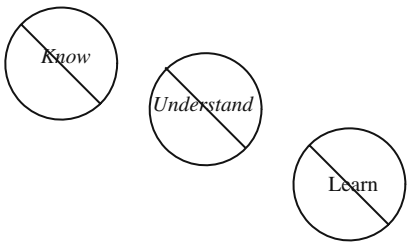


Fig. 1.5 These words are *not* acceptable when generating instructional goal statements

Practice Opportunity Use the Worksheet in Fig. 1.6 to apply what you've learned about *Generating Instructional Goals* to the situation described in the Firefighter Case located in Appendix A.

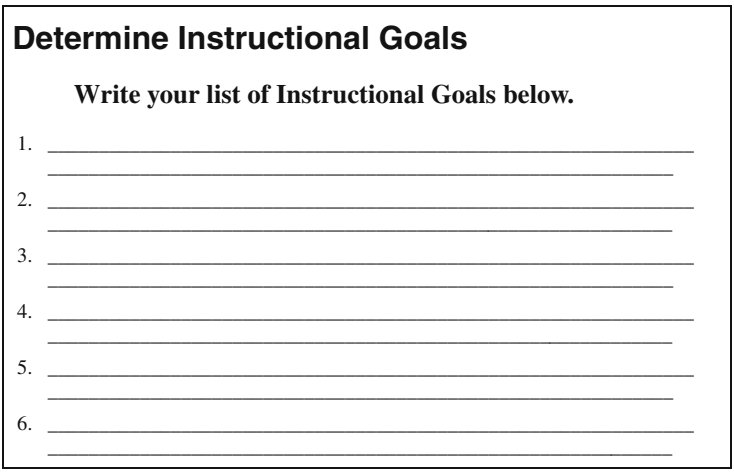


Fig. 1.6. Worksheet to practice composing instructional goals

Closure Consider the different types of learning that will be needed to achieve the instructional goals. Consider the prerequisite knowledge and skills required to start toward the instructional goals. Consider the abilities, capabilities, experiences, preferences, and availability of the learners for whom the goals are intended.

Confirm the Intended Audience

Objective Identify the abilities, experiences, preferences, and motivation of the student audience.

You Should Already Know That the purpose of this ADDIE project will be devoted to closing performance gaps caused by a lack of knowledge and skills.

Content One of the most important tasks that you will complete during the Analyze phase is to collect data that assist you in confirming the members of the intended student audience. The data that you collect will impact decisions throughout the remaining ADDIE processes. The types of data include but are not limited to

a. Group identifications
b. General characteristics
c. Numbers of students

d. Location of students
e. Experience levels
f. Student Attitudes
g. Skills that impact potential to succeed in the learning environment

Group Identifications

The first step is to identify the group or groups of learners who will become the students. This task is where you certify whether there is one group of learners or there are multiple groups of learners. After you have identified the learner groups, reconfirm that the group who will participate in the training is the *same* group whose performance you already assessed. You may need to reconfirm your performance gap analysis if the learner group is different from the one identified as having a performance gap.

General Characteristics

Next, describe the general characteristics of the learner group. Some of the characteristics you should determine include are average age, gender distribution, average level of education, cultural makeup, and language proficiencies. You will use this information for all subsequent phases of the ADDIE process. For example, the selection of exercises and examples used in the course may depend on the age of the group. Naming teams after the latest rock groups will not work well with the over 50 crowd while it may bring a sense of excitement to those under the age of 30. In the same way, utilizing the example of John Kennedy's oratory skills in a presentation skills class may be a stellar example for the over 50 age group; the skills of Barack Obama may be a more current example for those under 30.

Numbers of Students

The number of students should be determined. Consider the total number of students, the number of *different* audience groups *per class*, the number of learners per class, especially if such parameters already exist.

Location of Students

The location of the learning environment should be determined. Determine whether the students travel to a central location or whether the teacher travels to the location of the students.

Experience Levels

The experience of the students should be determined relative to the knowledge and skills that will be acquired prior to the development of any instructional materials. It is important to know what the student already knows and can do before she or he engages others within the learning environment. The average number of years of experience in a professional position or the number of years in school immediately preceding the course being designed can provide a clue to the current level of knowledge and skill that students will bring to the class, but that information may not be adequate. Also examine turnover rates and current level of knowledge and skills. You may have determined current performance levels when completing the performance assessment or you may need to re-examine the information you acquired and move to a deeper level of detail now.

Attitudes

It is extremely valuable to discover the attitude of the students who will likely interact with the instructional materials and instructional strategies. Things in the current political or economic climate such as current union negotiations may impact the learning environments; therefore, it is important to ascertain the current attitude a student may have toward her or his work or school surroundings. It is also prudent to determine the current attitude of a student toward her or his job. Things such as recent promotions or performance reviews may impact a student's current attitude. Even the student's attitude toward various types of learning environments can affect her or his attitude toward the planned instruction. Things such as a student's self-assessment of skills prior to a course may impact her or his current attitude.

Skills that Impact Potential to Succeed in the Learning Environment

Students can't improve their skills if they can't fully participate in the instructional experience. For example, if the instruction requires students to use Lotus Notes and the students are not fluent in Lotus Notes, the course will have little chance of success. Therefore, the prerequisite knowledge and skills the student must have related to the type of Delivery should be part of the Analyze phase. Use this phase to determine if there are any prerequisite skills the students should have to participate fully in the learning environment, such as the need for specific computer skills necessary or the need for particular language proficiencies.

Practice Opportunity

The data presented in the Sample Case in Fig. 1.7 are minimally acceptable at best. Certainly additional data and information about the students would increase the potential of the ADDIE process to close the performance gap for the causes related to knowledge and skills. Scrutinize the Learner Analysis for the *Sample Case* in Fig. 1.7. Consider ways to improve the data summary.

Sample Case: Escalator Maintenance

Learner Analysis

Primary Student Group
The student audience is approximately 560 escalator technicians throughout the company's operations in North America.

General Characteristics
The average age of these employees is 28; the age range is from 22 to 66. All have at least a high school diploma or equivalent. Only 32% were educated in English-speaking countries. Of the remaining 68%, most speak Spanish as their primary language. The gender breakdown of these employees is 65% female.

Numbers of Students
Based on a projected annual 20% turnover rate (of the current employees), an additional 112 technicians will need to be trained by this same time next year.

Location of Students
The company has decided that all training will occur at their 10 regional hubs in North America.

Experience Levels
Average time on the job is less than 2.5 years.

Student Attitudes
Continued employment is the prime motivation; meeting goals, including the elimination of personal injuries during a technician's work shift, is key to continued employment. These employees are apprehensive about job security and are overextended due to staff cutbacks and re-assignments. They are generally uncomfortable using computers and are slow to accept new methods.

Skills That Impact Potential to Succeed in the Learning Environment
Training methods that do not require computer usage may be most beneficial. Lessons presented in Spanish may be advantageous for the majority of these employees.

Fig. 1.7 Example of a minimally acceptable learner analysis

Practice Opportunity Apply what you've learned about *Conducting a Learner Analysis* (Fig. 1.8) to the situation described in the *Firefighter Case* in Appendix A.

Firefighter Case

Learner Analysis

Primary Student Group

General Characteristics

Numbers of Students

Location of Students

Experience Levels

Student Attitudes

Skills That Impact Potential to Succeed in the Learning Environment

Fig. 1.8 Learner Analysis template

Closure Confirm that you have identified the abilities, experiences, preferences and motivation of the student audience. Present the results in terms of the facts, rather than opinions.

Identify Required Resources

Objective Identify all types of resources that will be required to complete the entire ADDIE process.

You Should Already Know

1. The purpose of the ADDIE project
2. The instructional goals
3. The general characteristics of the intended students

Content

Four Common Resource Types

There are four types of Resources that should be audited:

1. Content Resources
2. Technology Resources
3. Instructional Facilities
4. Human Resources

Content Resources

Pre-existing resources may be available that contain valuable content. These resources could then be used as references for content, as references for learning strategies, as parts used in the learning environment without alteration, and as parts used only for illustration or examples.

Technology Resources

It is important to evaluate the available technology that is available for the learning environment. As you identify the available technology resources, keep in mind the number of computers available, if applicable, and any other electronic devices that will be required for hands-on activities. It is also important to identify non-digital technology that will be required to complete the entire ADDIE process, such as flip charts, writing utensils, dry marker boards, easels and, adhesive notepads.

Instructional Facilities

Instructional Facilities include things such as rooms available per location, the number of rooms required for the duration of the ADDIE process, the number of students that can be

accommodated per room, and any peculiar scheduling that should be considered around special times of the day and special dates of the year.

Human Resources

Human Resources that impact the design, development, and implementation of the learning environment need to be identified. Consider the number of teachers, trainers, and facilitators that will need to be available to fully develop, implement, and evaluate the instruction. Consider the level of expertise each teacher, trainer, and facilitator will bring to the ADDIE process. Identify the need for coaches and managers to provide continuous support throughout the ADDIE process, particularly the Implement and Evaluate phases. Generate a database of relevant names and contact information of subject matter experts and other stakeholders related to the project.

Practice Opportunity Scrutinize the Resource Audit for the *Sample Case* in Fig. 1.9 and recommend improvements.

Resource Audit for the Sample Case: Escalator Maintenance

Content	Technology	Facilities	Human
• Diagrams for escalator schematics near the service panels • Manuals with step-by-step descriptions of the safe operation have been located • Mock-ups are available at each learning facility of three primary types of escalators installed at Big Box Stores	• VCRs and monitors are available in all training locations • Mock-ups can be utilized for practice • Operational escalators can be utilized in all identified training locations • Video Production services has been contacted concerning a preliminary discussion and offered their participation • Flip charts and pens are available in all locations. One per room • White boards, pens, and erasers are in each teaching room in adequate numbers	• Training rooms that can accommodate the technology resources required have been identified • Up to 20 learners can be accommodated in each room at a time • The rooms are available to be reserved for the entire days of each date of the training session	• Spanish-speaking facilitators have been identified; however, their schedules will need to be carefully coordinated for implementation due to heavy demand for their services. No other experience is necessary. A train-the-trainer can provide the necessary expertise and a detailed Facilitator Guide will be produced. • Two subject matter experts have been identified to assist with the course development

Fig. 1.9 Sample resource audit

Practice Opportunity Apply what you've learned about *Conducting a Resource Audit* to the content from the *Firefighter Case* located in Appendix A.

Resource Audit for the Firefighter case

Content	Technology	Facilities	Human
•	•	•	•

Closure Summarize all of the resources required to complete all of the phases of the ADDIE process. Present the results to the client in terms of the facts, rather than opinions.

Determine Potential Delivery System

Objective Determine the potential delivery system and the estimated cost.

You Should Already Know

1. The purpose of the ADDIE project
2. The instructional goals
3. The general characteristics of the intended students
4. The resources required to complete the entire ADDIE process

Content The next procedure in the Analyze phase is to evaluate different instructional delivery systems and recommend the best option(s) that has the greatest potential to close the performance gap. Common delivery systems include

a. Physical Face-to-Face Meetings
b. Computer-based Training
c. Video
d. Internet-based Learning Management Systems
e. Blended (two or more of the above)

Each delivery system has advantages and disadvantages. The selection of delivery system should depend on how well the alternative contributes to the attainment of the training outcome desired. For example, using computer-based training would be ideal for hands-on practice in developing skills needed for using a new computer software program. Students in classroom without computer equipment would be less likely to attain the outcome desired.

Each recommended delivery option should include an estimate of the potential costs involved. While estimated costs can be projected, actual costs will be calculated for each of the ADDIE phases as each phase is completed. A systematic process is used to estimate the total cost for each potential delivery system.

Nine-Step Estimation Procedure

1. Identify the delivery options under consideration
2. Estimate the length of time for each delivery option under consideration
3. Compute cost for the *Analyze Phase* [*actual*]
4. Estimate cost for the *Design Phase*
5. Estimate cost for the *Develop Phase*

6. Estimate cost for the *Implement Phase*
7. Estimate cost for the *Evaluate Phase*
8. Total the estimated costs for all five ADDIE phases
9. Provide an estimated cost range (see Fig. 1.10 below for a sample of an estimated cost worksheet)

Determine Potential Delivery System (including cost estimate)
Sample Case: Escalator Maintenance

Step 1. Identify the delivery options under consideration.

Example

Option A: Classroom

Option B: Video and classroom combined

Step 2. Estimate the length of time for each delivery option under consideration

Example

Option A: 2 h

Option B: Classroom: 2 h including 15 min of video

Step 3. Estimate Analysis Costs

Compute the actual expenses in completing the Analysis and add to Cost Estimate Worksheet.

Example

Hours: 40 @ $55/h (designer cost) = $2200
Designer Total: $2200
Double the total (other costs such as time of those interviewed): $4400

Step 4. Estimate Design Costs

1) Calculate the Designer's time using the following guidelines:
   Classroom training: Use 1 Day of Designer time per day classroom training
   CBT: Use 1 day of Designer time per finished 5 min of CBT time
   Video: Use 1 day of Designer time per finished 10 min of video time
2) Multiply the estimated time by $55/h

Example

Option A

2 h Classroom training = 1 day Designer time

1 day (4 h) × \$55/h = \$220

Option B

2 h Classroom training = 1 day Designer time

15 min video = 1 day designer time

2 days (16 h) × \$55 h = \$880

Step 5. Estimate Development Costs

1) Calculate the Developer's time using the following guidelines:
   - Classroom training: Use 2 Days of Development time per finished hour of classroom training (This will include Desktop Publishing of the manuals and development of slides)
   - CBT: Use 3.5 days of Development time per finished 5 min of CBT time
   - Video: Use 1 day of Development time per finished 10 min of video time for scripting
2) Multiply the estimated time by \$55/h
3) Add production costs using the following guidelines:
   - Classroom manuals: Use \$10 per manual
   - Video: Use \$1000 per finished minute

Example

Option A

1) 2 h classroom training = 4 days development time
2) 4 days (32 h) × \$55/h = \$880
3) 560 Manuals @\$10 per manual = \$5600

Option B

1) 2 h classroom training = 2 days development time
   5 min of video = 1.5 days scripting development time
2) 5.5 days (44 h) × \$55/h = \$2420
3) 560 Manuals @\$10 per manual (\$5600) plus 15 min of Video @ \$1000/min (\$15,000) = \$20,600

Step 6. Estimate Implementation Costs

1) Calculate the Facilitator Costs

1. Calculate the # of Facilitators needed
2. Multiply by # of hours each will facilitate
3. Multiply the Total hours by $55/h
4. Add travel/accommodation costs

Example

Option A:

1. Calculate the # of Facilitators needed (83 classes)
2. Multiply by # of hours each will facilitate: 83 × 3 (1 h clean up) = Total Instructor Hours (249)
3. Multiply the Total Hours by $55/h = $13,695
4. Add travel/accommodation costs ($3000) = $16,695

2) Calculate the Learner's Costs

1. Calculate the # of Learners × number of class hours
2. Multiply by average salary
3. Estimate total travel costs per person
4. Total the Learner Costs

Example

Option A

1. Calculate the # of Learners × number of class hours: 560 × 2 = 1,120
2. Multiply by average salary: 1120 × $15/h = $16,800
3. Estimate total travel costs per person: 0
4. Total the Learner Costs: $17,920

3) Add #1 and #2 together to obtain Implementation Costs: $34,616

Step 7. Estimate Evaluation Costs

For estimation purposes, use the same figure for Evaluation Costs that was calculated for Analysis Costs. Evaluation Costs = $4400. Add this figure to the chart on the next page.

Step 8. Total the estimated costs for each of the five ADDIE phases.

Option A: $76,595
Option B: $94,795

Step 9. Provide an estimated cost range (+ or −20%)

	Option A	Option B
Estimated costs +20%	$91,914	$113,754
Estimated costs −20%:	$62,076	$75,836
Estimated Costs are	$62,000–$92,000	$76,000–$114,000

Sample Case: Escalator Maintenance Training

	Option A	Option B
Analyze Phase	$4400	$4400
Design Phase	$220	$880
Develop Phase Development Production	 $880 $12,500	 $2420 $27,500
Implement Phase	$54,195	$55,195
Evaluate Phase	$4400	$4400
Total	$76,595	$94,795
Estimated costs	$62,000–$92,000	$76,000–$114,000

Fig. 1.10 Estimated costs for the sample case

Practice Opportunity Apply what you've learned about *Estimating Costs* (Fig. 1.11) to the content from the *Firefighter Case* located in Appendix A.

Sample Case: Firefighter Case		
	Option A	Option B
Analyze Phase	$	$
Design Phase	$	$
Develop Phase Development Production	 $ $	 $ $
Implement Phase	$	$
Evaluate Phase	$	$
Total	$	$
Estimated costs	$ –$	$ –$

Fig. 1.11 Estimated costs template for the Firefighter case

Closure The client will use the cost estimates of the potential delivery systems to determine which option she or he chooses to move from the Analyze phase to the Design phase.

Compose a Project Management Plan

Objective Create a consensual document that confirms the expectations of all parties involved in the project.

You Should Already Know
1. The purpose of the ADDIE project
2. The instructional goals
3. The general characteristics of the intended students
4. The resources required to complete the entire ADDIE process
5. The potential delivery systems and general cost estimates

Content **Two rules of project management**:

1. A project has a beginning, middle, and an end
2. A project is measured in terms of quality, time, and money

A project is a "temporary endeavor undertaken to accomplish a unique product or service" (PMBOK® Guide 2000, p. 4). A project's purpose is unique, temporary, requires resources from a variety of domains, and typically has a primary

sponsor or client. Understanding these two rules of project management is essential to effective project management for practically any community.

The Project Management Institute (PMI) defines four major project phases: initiation, planning, execution, and closure. One could make the case that almost every project goes through these four phases. Within these phases are smaller gradations. Some methodologies suggest decomposing projects into phases, stages, activities, tasks, and steps. Cost and schedule estimates, plans, requirements, and specifications should be updated and evaluated at the end of each phase, sometimes before deciding whether to continue with the project. Large projects are usually structured to have major program reviews at the conclusion of significant project phases.

Consider the following sections of a project management plan:

1. *Core Instructional Design Team Members*
   Identify members of the project team and stakeholders. Document the organization of project.

2. *Significant Constraints*
   The constraints describe the conditions or capabilities that must be met or possessed by the products of the project to satisfy a contract, specification, or other formally imposed standard. The constraints identify the project boundaries by stating what is included within the project as well as what is excluded from the project. Project constraints list and describe the specific project constraints associated with the project scope that limits the team's options.

3. *Schedule Tasks*
   Scheduling is the timing and sequence of tasks within a project. A schedule consists mainly of tasks, task dependencies, durations, constraints, and time-oriented project information. A task is part of a set of actions which accomplish a job; the sense is that useful work is getting done. Duration is defined as a limited or specific period of time during which something happens, lasts, or extends. Constraints are defined as the act of limiting or condition of being limited. These are all key terms when dealing with scheduling. See Fig. 1.1 for additional terms related to scheduling tasks.

4. *Final Report*
   Many lessons will have been learned by the end of the project. Some of your ideas will have succeeded while other ideas will have failed. You may wish that you had

done things differently or that others had acted differently. Therefore, at the end of the project is your time to summarize what was done throughout the project and what has been learned to help know how to do things better on the next project. Your Final Report should answer:

a. What happened in the project?
b. What were the main milestones and activities?
c. Who participated in the project?
d. What did each person contribute to the project's completion?
e. What was the project's final output?
f. What is the current status of the project's output?
g. Were mistakes made in the Initiation Phase that resulted in the need to re-scope or redesign the project later?
h. Were mistakes made in the Planning Phase that resulted in inaccurate estimates, inappropriate resource planning, or rework?
i. What mistakes were made in the Implementation Phase?
j. What mistakes were made in the Close-Out Phase?

Practice Opportunity

Think of an instructional goal you have been meaning to address for sometime now. Use this section to practice composing some aspects of a management plan for an ADDIE project.

1. Core Team Members

List the position titles for the personnel required to accomplish the ADDIE process for the Firefighter Case. Indicate the skills each person brings to the process. Remember, more than one person with the same skill is usually needed to avoid work stoppage in the event a stakeholder becomes unexpectedly unavailable to the project once it has started. Add more rows, if necessary.

Position	Expertise

2. **Significant Constraints**
   The constraints describe the conditions or capabilities that must be met or possessed by the ADDIE products to satisfy a contract, specification, or other formally imposed standard. The constraints identify the boundaries by stating what is expected within the ADDIE project as well as what is excluded from the ADDIE project. Project constraints list and describe the specific project constraints associated with the project scope that limits the team's options. What are some constraints for the Firefighter Case?

3. **Schedule Tasks**
   Sketch a Gantt chart that indicates the main tasks and primary deliverables for the Firefighter Case. Keep your Gantt chart simple. A horizontal bar chart will suffice at this point (see Fig. 1.12).

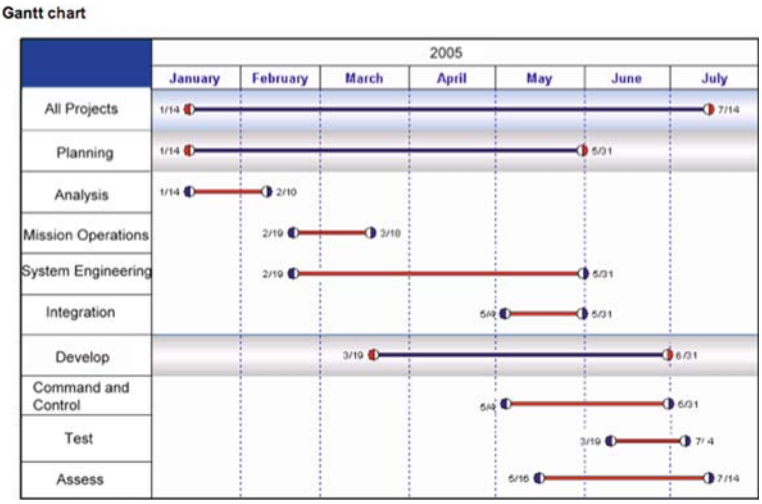


Fig. 1.12. Sample Gantt chart

4. **Final Report**
   A project ends by focusing on the future. A report that documents the history of a project facilitates the ending process. This is a post-implementation activity and provides a summary of activities during the ADDIE process. This post-implementation report also contains recommendations

for future projects of similar scope. The Final Report often includes, but is not limited to, items such as

1. Project team organization, including staffing and skills
2. Schedules
3. Successful risk assessment and mitigation actions taken
4. Processes used for change control, quality, and configuration management
5. Communication protocols used throughout the project
6. Techniques for managing stakeholder expectations
7. Success factors and how they were met
8. Financial data
9. Recommendations to future project managers
10. Lessons learned

Closure Confirm the expectations of all of the main stakeholders before your team begins to earnestly consume resources. Document the expectations vis a vis a project plan or work strategy document. Acquire written endorsements prior to initiating the next phases of the ADDIE approach to instructional design.

Result: Analysis Summary

The result of the Analyze phase is an ***Analysis Summary***. Common components of an Analysis Summary are as follows:

1. A Performance Assessment Report
2. A Purpose Statement
3. A List of Instructional Goals
4. A Student Profile
5. A List of Required Resources
6. Potential Delivery Systems (including cost estimates)
7. A Project Management Plan

During the client meeting where the Analysis Summary is delivered, usually one of two things happen: (A) the client requests changes to the analysis or (B) the client is satisfied. If the client request changes, repeat the Analyze phase or relevant parts of the Analyze phase and prepare a revised Analysis Summary document. If the client is satisfied, then obtain the appropriate endorsements and proceed to the Design phase.

	Analyze	Design	Develop	Implement	Evaluate
Concept	Identify the probable causes for a performance gap	Verify the desired performances and appropriate testing methods	Generate and validate the learning resources	Prepare the learning environment and engage the students	Assess the quality of the instructional products and processes, both before and after implementation
Common Procedures	1. Validate the performance gap 2. Determine instructional goals 3. Confirm the intended audience 4. Identify required resources 5. Determine potential delivery systems (including cost estimate) 6. Compose a project management plan	7. Conduct a task inventory 8. Compose performance objectives 9. Generate testing strategies 10. Calculate return on investment	11. Generate content 12. Select or develop supporting media 13. Develop guidance for the student 14. Develop guidance for the teacher 15. Conduct formative revisions 16. Conduct a Pilot Test	17. Prepare the teacher 18. Prepare the student	19. Determine evaluation criteria 20. Select evaluation tools 21. Conduct evaluations
	Analysis Summary	***Design Brief***	***Learning Resources***	***Implementation Strategy***	***Evaluation Plan***

Chapter 2
Design

Contents

Abstract The purpose of the Design phase is to verify the desired performances and appropriate testing methods. Upon completion of the Design phase, you should be able to prepare a set of functional specifications for closing the performance gap due to a lack of knowledge and skills. The Design phase establishes the "Line of Sight" for progressing through the remaining ADDIE phases. Line of Sight refers to an imaginary line from the eye to a perceived object. An example of the line-of-sight concept is in communication where the transmitter and receiver antennas are in visual contact with each other. Line-of-Sight theory supposes that in order to view an object, you must sight along a line at that object; and when you do light will come from that object to your eye along the line of sight. Line of Sight is presented here as a practical approach for maintaining an alignment of needs, purpose, goals, objectives, strategies, and assessments throughout the ADDIE process. The varying levels of expertise among the stakeholders participating in the ADDIE process, and other contextual variables, require maintaining the line of sight throughout the entire ADDIE process. The notion of line of sight will directly influence the design team's management and development activities. Activities beyond the scope of the project and matters unrelated to closing the performance gap may obfuscate the line of sight. During the client meeting where the Design Brief is delivered, there should be a high degree of confidence about the pathway to closing the performance gap.

R.M. Branch, *Instructional Design: The ADDIE Approach*,
DOI 10.1007/978-0-387-09506-6_3, © Springer Science+Business Media, LLC 2009

Key Words Design · Process · Plan · Scope · Line of sight · High fidelity · Stakeholder · Project management · Testing

Introduction to Design Phase

The purpose of the Design phase is to verify the desired performances and appropriate testing methods. The common procedures associated with the Design phase are as follows:

1. Conduct a task inventory
2. Compose performance objectives
3. Generate testing strategies
4. Calculate return on investment

Upon completion of the Design phase, you should be able to prepare a set of functional specifications for closing the performance gap due to a lack of knowledge and skills. The Design phase established the "Line of Sight" for progressing through the remaining ADDIE phases. Line of Sight refers to an imaginary line from the eye to a perceived object. An example of the line-of-sight concept is in communication where the transmitter and receiver antennas are in visual contact with each other (Fig. 2.1). Line-of-Sight theory supposes that in order to view an object, you must sight along a line at that object; and when you do light will come from that object to your eye along the line of sight. Line of Sight is presented here as a practical approach for maintaining an alignment of needs, purpose, goals, objectives, strategies, and assessments throughout the ADDIE process (Fig. 2.2).

Due to the variety of procedures associated with the ADDIE process, the varying levels of expertise among the stakeholders participating in the ADDIE process, and other contextual variables as well, maintain the line

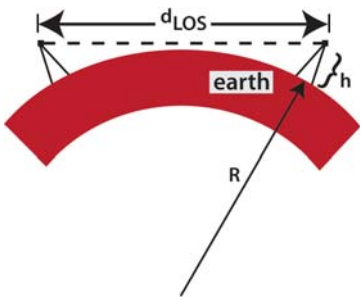


Fig. 2.1 Line-of-Sight concept

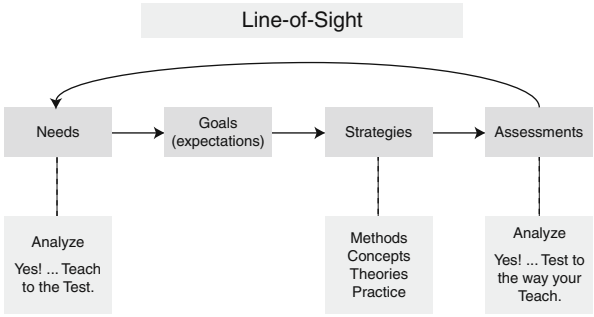


Fig. 2.2. Line of Sight applied to ADDIE

of sight throughout the entire ADDIE process deserves special attention. The notion of line of sight will directly influence the design team's management and development activities. Activities beyond the scope of the project and matters unrelated to closing the performance gap may obfuscate the line of sight. Identify strategies for maintaining line of sight throughout the ADDIE process and correct alignment problems early and often.

The result of this phase is a Design Brief. Common components of a Design Brief are as follows:

1. A task inventory diagram
2. A complete set of performance objectives
3. A complete set of test items
4. A testing strategy
5. A return on investment proposal

During the client meeting where the Design Brief is delivered, there should be a high degree of confidence about the pathway to closing the performance gap. If the client is satisfied, then obtain the appropriate endorsements and proceed to the Develop Phase. The remainder of this chapter is devoted to the common procedures of the Design phase.

Conduct a Task Inventory

Objective Identify the essential tasks required to achieve an instructional goal.

You Should Already Know
1. The instructional goals
2. General characteristics of the student groups
3. All of the resources required to complete the ADDIE process
4. The probable delivery system

5. General budgets
6. The core team members and their primary tasks

Content

Introduction

Conducting a Task Inventory is the first procedure in the Design phase of the ADDIE process. Although the client may not see the Task Inventory, a task inventory is important because it

1. Specifies the desired performances
2. Identifies the primary learning tasks required to achieve a goal
3. Inventories the steps required to perform complex tasks
4. Facilitates a way to determine learner readiness

A Task Inventory logically organizes the content so that the students can construct the knowledge and skills necessary to achieve the instructional goals. The term inventory literally means a complete list of items. The items, within this context, refer to the performance tasks required by the student to achieve an instructional goal. The result of a Task Inventory is a diagram that specifies the *essential* Tasks Required to accomplish the instructional goals (see generic example in Fig. 2.3).

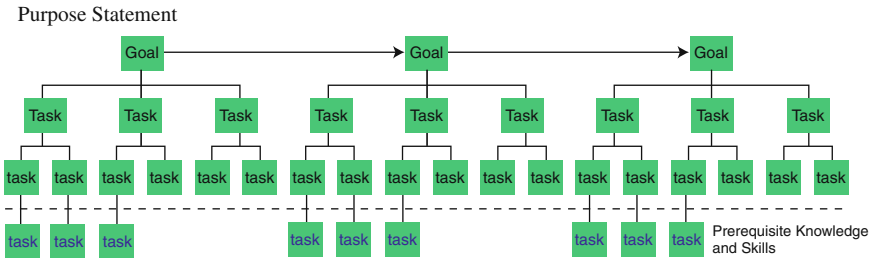


Fig. 2.3. Example of a generic Task Inventory

Assumptions[1]

Some assumptions associated with the concept of task inventory are as follows:

[1] (Adapted from Task Analysis Methods for Instructional Design Jonassen, Tessmer & Hannum, 1999, pp. 3–5.)

1. That a task inventory is essential to good instructional design
2. That a task inventory is the least understood component of the instructional design process
3. That a task inventory is less than an exact science
4. That a task inventory is only as reliable as the last verification
5. Different contexts demand different inventory methods, in other words, *one size does not fit all*!

The concept of a task inventory within the context of instructional design is a way to identify the essential items that need to be learned in order to accomplish a particular goal. This instructional design procedure is often referred to as task analysis. Instructional goals can be analyzed according to the knowledge, skills, attitudes, and procedures that one must perform in order to achieve a goal. Goals are broad and general descriptions of knowledge, skills, attitudes, and procedures. A task inventory specifies the performances required to achieve the instructional goals.

Task = An apportionment of work; usually an assigned piece of work intended to be finished within a certain period of time. This section focuses on three types of tasks:

1. Cognitive tasks
2. Motor tasks
3. Procedural tasks

(see Fig. 2.4)

Cognitive Task	Involves *thoughts*, *ideas*, *and perceptions*	Knowledge
Motor Task	Involves *physical* exertion	Skill
Order Task	Involves a *sequence* of tasks	Procedure

Fig. 2.4 Three categories of performance tasks commonly associated with instructional design

Performance Task

Performance tasks represent several types of learning and various levels of learning. Consider Bloom's Taxonomy in Fig. 2.5 as an example.

Knowledge	· Observation and recall of information · Knowledge of dates, events, places · Knowledge of major ideas
Comprehension	· Translate knowledge into new context · Interpret facts, compare, contrast · Order, group, infer causes
Application	· Use information · Use methods, concepts, theories in new situations · Solve problems using required skills or knowledge
Analysis	· Seeing patterns · Organization of parts · Identification of components
Synthesis	· Use old ideas to create new ones · Generalize from given facts · Relate knowledge from several areas
Evaluation	· Compare and discriminate between ideas · Assess value of theories, presentations · Verify value of evidence

Fig. 2.5 Adapted from Bloom, B.S. (Ed.) (1956) Taxonomy of educational objectives: The classification of educational goals: Handbook I, cognitive domain. New York; Toronto: Longmans, Green

The four steps for conducting a Task Inventory are as follows:

First. Repeat the Purpose Statement
Second. Reaffirm the Instructional Goals
Third. Identify the primary performance tasks
Fourth. Specify prerequisite knowledge and skills

Step 1: Repeat the Purpose Statement

The purpose statement has probably evolved since the end of the Analyze Phase. Therefore, the most current statement

should be repeated to assure that all stakeholders refer to the same purpose.

Step 2: Reaffirm the Instructional Goals

Reaffirm the instructional goals as they relate to the stated purpose. The goals should complement the Purpose Statement. See the following examples in Fig. 2.6.

Purpose Statement	Instructional Goals
The purpose of this initiative is to develop skills and incorporate a Change Management process part of the project manager's responsibility	1. Define change management 2. Promote consistent use of change management terminology 3. Create awareness of the change management process 4. Integrate change management into the project management process 5. Assess stakeholder willingness to accept change
The purpose of this training is to provide teachers with effective strategies for using modeling-based inquiry with Astronomicon in their 9–12 classrooms	1. Describe models using basic and complex astronomical concepts 2. Explain the function and meaning of each menu item of the Astronomicon software 3. Prepare a lesson plan for modeling-based inquiry activities using the Astronomicon software 4. Teach complex astronomy concepts using Astronomicon models 5. Assess the quality of peer and facilitator lesson plans using Astronomicon software

Fig. 2.6 Examples of complementary purpose statement and goal statements

Step 3: Identify the Essential Performance Tasks

Identify the essential tasks required to achieve an instructional goal. Identifying the essential tasks is accomplished through the following data collection strategies:

a. Observation of skilled performers
b. Videotape review of skilled performers
c. Interviews
d. Technical manual review
e. Documentation review
f. Focus groups
g. Complete the task yourself

The following process techniques can facilitate the data collection process during independent work and teamwork as well:

a. Flip charts
b. Bulletin boards
c. Concept maps
d. Sticky notes
e. Compiling separate diagrams for each goal inventory (Fig. 2.7)

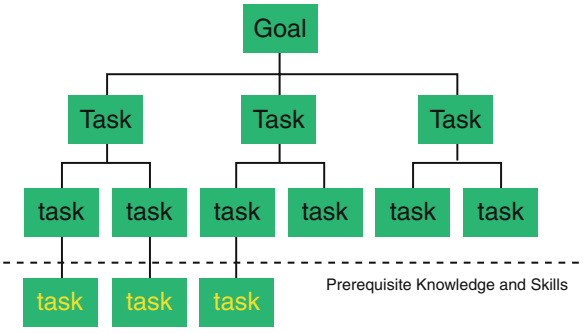


Fig. 2.7 Example of a single Goal Inventory

Guidelines for Constructing a Task Inventory

1. *All* tasks should begin with a performance verb [including prerequisites]
2. Tasks should *not* include the conditions for the performance
3. Tasks should *not* include the criterion for the performance
4. Do not repeat any tasks in the entire inventory diagram
5. Each task statement should be as specific as possible
6. Each task statement should be measurable
7. Use a visual convention for separating the prerequisites from the other tasks, such as a broken line
8. The inventory diagram should flow up and over to the right
9. *Avoid the words* "***Learn***," "***know,***" and "***Understand***"
10. No objectives yet!

Practice Opportunity Identify the essential tasks for one of the instructional goals that you determined earlier from the *Firefighter Case* in Appendix A.

Directions

1st : Write the current Purpose Statement.

_____

_____

_____

_____

_____

2nd : Select *one Instructional Goal*.

3rd : Identify *all* of the essential tasks required to achieve the selected instructional goal.

4th : Identify at least one level of prerequisite tasks.

5th : Create a diagram of a your single goal inventory.

Closure

1. The task is the foundation for a performance objective
2. Performance objectives are the reference points for the remainder of the ADDIE process
3. The next procedure is to compose performance objectives

Compose Performance Objectives

Purpose

Compose objectives that include a condition component, a performance component, and a criterion component.

You Should Already Know

1. All of the main performance tasks for each of the instructional goals that have already been determined
2. The capabilities and the general abilities of the students who will likely be engaged in the intentional learning environment
3. The prerequisite tasks required in order to start the intentional learning process

Content

Objectives are like the destination for a trip you're about to take. They're the end point that you have in mind as you begin to plan your trip. A performance objective is the destination for an instructional episode. A performance objective defines the

1. Performance the student should exhibit before considered competent
2. Condition under which the performance is measured
3. Acceptable standard of the student's performance

There should be high congruence between the performance objectives and the instructional goals. While the instructional goals provide the general expectations, performance objectives provide the specific expectations.

An objective provides a way to judge when a specific desired performance has been attained. Categories of learning such as Bloom's Taxonomy can be used to specify learning outcomes.

Cognitive Domain

The cognitive domain is divided into several levels with the lowest skill level placed on the bottom level and the higher levels radiating upward:

- Evaluation (Highest level)
- Synthesis
- Analysis
- Application

- Comprehension
- Knowledge (Lowest level)

A performance objective provides guidance for

a. The proper testing methods
b. The selection of content
c. The selection or development of media
d. Determining appropriate instructional strategies
e. Assessing student readiness
f. Measuring student achievement
g. Identifying the knowledge and skills required by the teacher
h. Required resources
i. Translating performance tasks into student actions that can be measured

There are three components of a performance objective:

1. *Performance*
   What the student will do?

2. *Condition*
   Important circumstances under which the performance is expected to occur.

3. *Criteria*
   The quality or standard of performance that is considered acceptable.

See the three-component performance objectives examples below:

1. Write a job description for a project manager prior to the next team meeting using 750 words (+ or – 50 words), and approved by your immediate supervisor.
2. Establish project parameters during an initial client meeting consistent with standard operating procedures.
3. Create the foundation layer for a patchwork quilt using cotton blend fabric according to the samples on display.
4. Generate a mnemonic for memorizing the four aerodynamic forces to use during the construction of a 20:1 scale model airplane.

Practice Opportunity

First, Critique the objectives in Fig. 2.8.
Second, Compose two to three performance objectives for your work area (Fig. 2.9).

Objectives Critique Exercise

Directions

1. Below are some sample objectives. Circle the components that appear correctly in the objective (**C** = *Condition* **P** = *Performance* **S** = *Criteria*).
2. Rewrite any parts of the objective that you think are missing or need to be improved.

A. While preparing a cake for a group of diabetic residents in a long-term care facility, add heavy cream according to the guidelines established by the National Dieticians Society.
Any Revisions?_____

B. Given human anatomy charts (male and female), students will be able to locate and label human reproductive organs 100% correctly based on human anatomy guide of the class.
Any Revisions?_____

C. Having viewed the movie "Deep Impact," students will propose at least two pros and two cons as evidence to judge the consequences of providing advanced warning for an impending Earth impact.
Any Revisions?_____

D. After 2 days of grilling lesson, grill a chicken.
Any Revisions?_____

E. Exchange e-mail with other students.
Any Revisions?_____

F. Understand the Bill of Rights for the Constitution of the United States of America.
Any Revisions?_____

Fig. 2.8 Objective statements of varying degrees of quality

Performance _____

_____

Condition(s) _____

_____

Criteria _____

_____

Performance _____

_____

Condition(s) _____

_____

Criteria _____

_____

Performance _____

_____

Condition(s) _____

_____

Criteria _____

_____

Fig. 2.9 Template for composing with performance, condition and criteria components objectives

Closure

1. Confirm that the objectives are congruent with the Instructional Goals.
2. Begin to think about the best ways to generate e-learning opportunities that will help the student accomplish the performance objectives.

Generate Testing Strategies

Objective Create items to test student performance.

You Should Already Know That the criterion component of a performance objective provides the standard of measure for determining success.

Content Testing is an integral part of performance-based learning. Testing provides feedback to the teacher about whether learning is occurring, to the learner about the progress he or she is making toward accomplishing the performance tasks, and to the designer about how well the instruction is facilitating the goals and objectives.

The performance task is essentially the test. Testing strategies should have high fidelity between the task, the objective, and the test item. Test items should be authentic and simulate performance space.

It is important to discover answers to the following questions:

1. Did the student demonstrate the required performance?
2. Did the student meet the criteria for performance?
3. Did the student perform under the condition specified?

In other words, testing is necessary to discover whether or not the student accomplished the goals and objectives as determined during the ADDIE process.

Performance Match

The performance required by the student should match one of Bloom's levels of learning.

Condition Match

The test should also be congruent with the condition that appears in the objective.

Criteria Match

The criteria used in the test should also be congruent with the criteria stated in the objective.

Sample

Task	Objective	Test Item
Draw a floor plan	Draw a floor plan to give to the building contractor that satisfies all county codes and regulations	Using a computer-aided design tool, draw a floor plan for the lower level of a new home construction of approximately 1,175 square feet

Practice Opportunity Apply what you've learned about *Generating Testing Strategies* to the *Firefighter Case* in Appendix A using the template in Fig. 2.10.

Directions

1. Select a task from the Firefighter Case.
2. Select a corresponding performance objective from the Firefighter Case.
3. Generate a test item congruent with each performance objective.

Task	Objective	Test item

Fig. 2.10 Template for practice composing performance objectives

Closure

1. The higher the congruency between the task, objective, and test item, the better potential for a successful course of study and companion learning resources.
2. The greater the authenticity of the instructional strategies and the learning resources, the greater potential for the course of study to close the performance gap.
3. Remember: you are limited only by your creativity.

Calculate Return on Investment

Objective Estimate the cost for completing the entire ADDIE process.

You Should Already Know The goals, objectives, testing strategies, and all of the resources required to complete the entire ADDIE process.

Calculating ROI The procedure for calculating ROI is as follows:

1. Calculate the training costs
2. Calculate the benefits derived from the training
3. Compare the training benefits to the training costs

The formula looks as follows:

$$\textbf{ROI (In Percentage)} = \frac{\text{Training Benefits}}{\text{Training Costs}} \text{ X } \mathbf{100}$$

What Do the Figures Mean?

- If the figure that results from the calculation is greater than 100%, then the benefit the training provides outweighs the cost.
- If the figure that results from the calculation is less than 100%, then the costs of the training outweigh the benefit.

Calculating Training Costs

In order to determine the costs of the training, re-evaluate and further refine the costs you estimated during the Analysis Phase. Now that you have designed the training, you should be able to closely approximate actual costs for each phase.

Re-estimate the costs for each ADDIE phase:

Analyze
Design
Develop
Implement
Evaluate

Calculate Analyze Costs

One of the most overlooked expenses of curriculum development is the cost of analysis. At this point in the ADDIE process, you can actually total the costs you incurred during the Analysis phase.

The costs involved usually include items such as

- Salary for the person's who conducted the analysis (based on actual time spent on analysis)
- Travel and meals
- Office supplies
- Printing
- Equipment expenses

Sample Case

Look at the example presented in the *Sample Case*.

Design Costs

Next, re-calculate the Design costs based on actual costs incurred.
Costs for the Design phase include items such as

- Designer's time
- Travel and meals
- Office supplies
- Printing
- Equipment expenses

Develop Costs Now, re-estimate the costs for the Develop phase based on a more specific design concept.

Costs for the Development phase include items such as

- Designer time for development of the Facilitator and Participant Guides
- Media development costs
- CBT development costs
- Graphic artist costs
- Desktop production costs
- Travel and meals
- Office supplies
- Printing
- Equipment expenses

Sample Case

In the Sample Case, it was decided during the Design phase to produce two videos instead of one, one in Spanish and one in English. The revised development costs reflect the increased costs of production.

Implement Costs Next, re-estimate the costs for Implementing the training based on your revised Analysis and proposed Design. Costs for the Implement phase of the process include items such as

- Participant time (based on average salary)
- Facilitator time (based on average salary)
- Participant travel and accommodation costs
- Facilitator travel and accommodation costs
- Printing of materials
- Tracking and scheduling costs
- Facility costs

Evaluate Costs Lastly, revise your estimates of the cost to Evaluate the training based on your Evaluation Plan (see Section 6). Costs for the Evaluation phase of the process include

- Evaluator time (based on average salary)
- Evaluator travel costs
- Participant time (based on average salary)
- Office supplies
- Printing
- Equipment expenses

Total Costs Total the costs for each of the five ADDIE phases to obtain your Total Costs.

Sample Case

Notice the (revised) Total Costs for the Sample Case

Cost/Benefit for the Sample Case

Analyze	
Item	**Cost**
Instructional Designers' Salaries/Benefits	3,200.00
Meals, Travel, and Incidental Expenses	800.00
Office Supplies and Related Expenses	40.00
Printing and Reproduction	0
Outside Services	0
Equipment Expenses	0
Professional Fees	0
Miscellaneous Expenses	1,000.00
Total	**$5,040.00**

Design	
Item	**Cost**
Instructional Designers' Salaries/Benefits	2,750.00
Meals, Travel, and Incidental Expenses	0
Office Supplies and Related Expenses	40.00
Printing and Reproduction	0
Outside Services	500.00
Equipment Expenses	0
Professional Fees	0
Miscellaneous Expenses	0
Total	**$2,790.00**

Develop	
Item	**Cost**
Instructional Designers' Salaries/Benefits	3,200.00
Meals, Travel, and Incidental Expenses	0
Office Supplies and Related Expenses	0
Printing and Reproduction (Manuals)	12,500.00
Production Services	18,000.00
Equipment Expenses	0
Professional Fees	0
Miscellaneous Expenses	0
Total	**$33,700.00**

Implement	
Item	**Cost**
Student (meals, travel, lodging, salaries)	37,500.00
Instructor	17,695.00
Employee Replacement	0
Tracking and Scheduling	100.00
Training Materials and Supplies	500.00
Lost Production	0
Facility	0
Miscellaneous Expenses	0
Total	**$55,795.00**

Evaluate	
Item	**Cost**
Salaries/Benefits	5,040.00
Meals, Travel, and Incidental Expenses	400.00
Learner Expenses	1,200.00
Office Supplies and Expenses	100.00
Printing and Reproduction	0
Outside Services	0
Equipment Expenses	0
Miscellaneous Expenses	0
Total	**$3,700.00**

All five ADDIE Phases	
Analysis	5,040.00
Design	2,790.00
Development	33,700.00
Implementation	55,795.00
Evaluation	3,700.00
Total	**$101,025.00**

Benefit After the projected costs have been revised, the next step is to quantify the value or benefit that is derived from the training. To determine the benefit, follow these steps:

- Generate a list of potential benefits
- Assign a realistic dollar value to each benefit
- Total the dollar benefits

Generate a List of Potential Benefits

Potential benefits of training include

- Increased productivity
- Improved safety
- Decreased costs
- Increased savings

Sample Case

Benefits expected from trained escalator maintenance technicians as described in the *Sample Case* include cost savings that will result from fewer personal injuries due to escalator malfunctions.

Assign Values

After determining the benefit derived from the training, assign a realistic dollar value to that benefit.

For example, if the result improves productivity, one can estimate how much that productivity would be improved as a result of the training. By multiplying the increased productivity by the average salary of the student, a dollar value can be assigned to the benefit.

Sample Case

The example shown below utilizes cost savings as the potential benefit.

Example

Assign values to the benefits expected from the training described in the Sample Case.

Average Costs Per Escalator Malfunction	
Maintenance cost	$5,240
Repair cost	$8,500
Equipment delay	$2,270
Personal injury liability	$13,100
Total cost per development	**$29,110**

Potential Benefit ($)

- The total cost of escalator malfunctions per year is $3,493,200 or (120 × $29,110).
- It is estimated that training for escalator maintenance technicians will reduce the number of escalator malfunctions by 25% (50% is thought to be caused by mischievous patrons and improved security is projected to eliminate half of the malfunctions caused by something other than mechanical failure).
- The total cost savings is projected to be $873,300.

ROI Example Next, calculate the ROI for the *Sample Case* using the formula as follows:

$$\textbf{ROI (in percentage)} = \frac{\text{Training Benefits}}{\text{Training Costs}} \text{ X } \mathbf{100}$$

$$\textbf{ROI} = \frac{\$873,300}{\$101,025} \text{ X } \mathbf{100} = \mathbf{864}\%$$

The ROI of conducting the training is 864%.

Our calculation shows that conducting the training as planned would return an investment of $864 for every dollar it invests in the training. (Note: It is *very* unusual for training to provide a return on investment that is as high as this example.)

Closure Be very careful not to overestimate the benefit the client will derive from any single training event. Keep in mind the following facts:

1. Productivity is extremely difficult to raise and keep at a consistently high level
2. Training participants retain only a fraction of skills that are not reinforced on a regular basis
3. Transference from the classroom to the work site depends on many factors including the skill of the designer in designing practice opportunities that simulate the workplace as close as possible

Result: Design Brief

The result of the Design phase is a *Design Brief*. Common components of the Design brief are as follows:

1. A Task Inventory
2. A Comprehensive List of Performance Objectives
3. A Complete Set of Test Items
4. A Comprehensive Testing Strategy
5. A Cost–Benefit Calculation

During the client meeting where the Design Brief is delivered, usually one of two things happen: (A) the client requests changes to the functional specifications or (B) the client is satisfied. If the client request changes, repeat the Design phase or relevant parts of the Design phase and prepare a revised Design Brief. If the client is satisfied, then obtain the appropriate endorsements and proceed to the Develop phase.

	Analyze	**Design**	**Develop**	**Implement**	**Evaluate**
Concept	Identify the probable causes for a performance gap	Verify the desired performances and appropriate testing methods	Generate and validate the learning resources	Prepare the learning environment and engage the students	Assess the quality of the instructional products and processes, both before and after implementation
Common Procedures	1. Validate the performance gap 2. Determine instructional goals 3. Confirm the intended audience 4. Identify required resources 5. Determine potential delivery systems (including cost estimate) 6. Compose a project management plan	7. Conduct a task inventory 8. Compose performance objectives 9. Generate testing strategies 10. Calculate return on investment	11. Generate content 12. Select or develop supporting media 13. Develop guidance for the student 14. Develop guidance for the teacher 15. Conduct formative revisions 16. Conduct a Pilot Test	17. Prepare the teacher 18. Prepare the student	19. Determine evaluation criteria 20. Select evaluation tools 21. Conduct evaluations
	Analysis Summary	***Design Brief***	***Learning Resources***	***Implementation Strategy***	***Evaluation Plan***

Chapter 3
Develop

Contents

Abstract The purpose of the Develop phase is to generate and validate selected learning resources. Upon completion of the Develop phase, you should be able to identify all of the resources that will be needed to undertake the planned episodes of intentional learning. By the end of the Develop phase, you should also have selected or developed all of the tools needed to implement the planned instruction, evaluate the instructional outcomes, and complete the remaining phases of the ADDIE instructional design process. The result of this phase is a comprehensive set of learning resources, such as all of the content, instructional strategies, and other lesson plans, educational media needed to support the learning modules, a comprehensive set of directions for each instructional episode and independent activities that facilitate the student's construction of knowledge and skills, a comprehensive set of directions that will offer guidance to the teacher as he or she interacts with the students during the course of the planned instruction, a formative evaluation plan, and a summary of significant revisions that were made during the Develop phase. During the meeting where the learning resources are presented to the client, the focus should be on communicating the confidence of the design team in the learning resources being able to close the performance gap for the causes due to a lack of knowledge and skills.

Keywords Develop · Evaluate · Instructional design · Knowledge and skills · Formative evaluation · Summative evaluation · Performance gap · Media · Instructional media

R.M. Branch, *Instructional Design: The ADDIE Approach*,
DOI 10.1007/978-0-387-09506-6_4, © Springer Science+Business Media, LLC 2009

Introduction to Develop Phase

The purpose of the Develop phase is to generate and validate selected learning resources. The common procedures associated with the Develop phase are as follows:

11. Generate Content
12. Select or Develop Supporting Media
13. Develop Guidance for the Student
14. Develop Guidance for the Teacher
15. Conduct Formative Revisions
16. Conduct a Pilot Test

Upon completion of the Develop phase, you should be able to identify all of the resources that will be needed to undertake the planned episodes of intentional learning. Further, by the end of this phase, you should have selected or developed all of the tools needed to implement the planned instruction, evaluate the instructional outcomes, and complete the remaining phases of the ADDIE instructional design process.

The result of this phase is a comprehensive set of learning resources. The primary resources that should be available at the end of this phase are the following:

1. Content
2. Sources for additional content
3. Lesson plans
4. Instructional strategies
5. Selected media to facilitate the learning process
6. A comprehensive set of directions for each instructional episode and independent activities that facilitate the student's construction of knowledge and skills
7. A comprehensive set of directions that will offer guidance to the teacher as he or she interacts with the students during the course of the planned instruction
8. A formative evaluation plan
9. A summary of significant revisions
10. The results of a pilot test

During the meeting where the learning resources are presented to the client, the focus should be on communicating the confidence of the design team has in the learning resources being able to close the performance gap for the causes due to a lack of knowledge and skills. If the client is satisfied, then obtain the appropriate endorsements and proceed to the Implement phase. The remainder of this chapter is devoted to the common procedures of the Develop phase.

Generate Content

Objective Generate learning plans.

You Should Already Know

A. The specific performance objectives for all of the instructional goals
B. The testing strategy for judging the degree of success
C. The test items for the performance objectives
D. Any functional specifications required to support the learning context

Content Introduction

Content is the focal point for engaging the student during the process of knowledge construction. However, content should be strategically introduced during the teaching and learning sessions. Thus, instructional strategies become the overt means by which knowledge, skills, and procedures are exchanged during an episode of intentional learning. Effective episodes of intentional learning should have a beginning, middle, and an end. Instructional strategies organize the external events that occur during each learning episode.

Instructional Strategies: *Concept*

Student-centered strategies should be the guiding framework for accomplishing the performance objectives. The planned activities should be based on the performance objective and the student's background. While the goals and objectives remain constant, the prerequisites and communication methods will vary depending on a student's reason for participating in an instructional episode (motivation), a student's capacity to construct knowledge and skill (rate), and a student's expression for how she or he prefers to learn (style). Instructional strategies should seek to accommodate the student's motivation for learning, the students' rates of learning, and the each student's learning style.

Instructional Strategies: *Theory*

An instructional strategy is defined as the organization and sequence of learning activities. The learning activities are an attempt to arrange a set of external events to facilitate the interpretation, construction, and manifestation of knowledge and skills for a

student. The events of an instructional strategy will vary depending on the context, resources, and needs of the students. The names of the events and activities may vary due to legacy systems and current trends, but the theories remain essentially the same. A complete instructional strategy should have a beginning, middle, and an end. Therefore, beginning activities, middle activities, and ending activities mark each episode.

Beginning Activities

Begin episodes with

- Motivational tasks (gain students' attention)
- Information about the expectations (clarify the objectives)
- Confirmation of the prerequisites
  (review knowledge and skills required to start this episode)

Middle Activities

Middle activities tend to facilitate the most interaction between the student, teacher, media, and content. Content exchanges are the vehicles whereby learners have an opportunity to acquire knowledge and build skills. Effective content exchanges and skill building activities include

1. Demonstrations
2. Role plays
3. Simulations
4. Discussions
5. Presentations
6. Case-based exercises
7. Project-based exercises
8. Games
9. Observation
10. Group question development
11. Peer teaching
12. Peer review

Other Middle Activities incorporate opportunities for:

- *Guided Practice*
  Guided practice provides opportunities for the teacher or a student to lead peers in specific activities related to the objective. Guided

practice events are developed to move the student from known to unknown, easy to difficult, simple to complex, and concrete to abstract.

- *Independent Practice*
  Independent practice provides opportunities for the student to exhibit the knowledge and skills encumbered in the objective. Independent practice events are developed to simulate the expectations of the student in performance space.

- *Feedback*
  Feedback provides opportunities to determine student progress. Feedback events are developed for the teacher and the student to make necessary adjustments during an episode.

- *Assessment*
  Assessment provides opportunities to test new knowledge and skills constructed by the student. Assessment events are developed to ascertain the potential for a student to perform specific tasks outside the learning space.

Ending Activities

An extremely important event is closure. Closure helps the student connect the knowledge, skills, and procedures that were introduced during the episode. Closure can include activities such as

a. Debriefs at the end of activities
b. Transitions from one episode to another episode
c. Review activities
d. Summaries
e. Action Plans

Instructional Strategies: *Practice*

There are many effective application frameworks that implement the beginning, middle, and end theory of instructional strategy development. However, this book has chosen to focus on a single application framework called the nine events of instruction. Dr. Robert M. Gagné (1916–2002), Professor Emeritus of Educational Psychology and Instructional Design, developed a method for organizing different instructional strategies within the scope of a single lesson. Professor Gagné's method of organization has come to be known as *Gagné's Nine Events of Instruction* (Fig. 3.1).

Gagné's Nine Events of Instruction

Theory	*Event*	Sample Activity
Reception	**1. Gaining Attention**	a. Share a current event about a classmate b. Begin with question: "What do you think?" c. Initiate the class in a foreign language or jargon
Executive Control	**2. Inform Learner of Lesson Objectives**	d. Review course objectives in terms of WIIFM e. Post objectives in outline form f. Video demonstrations of actual performance
Retrieval	**3. Stimulating Recall of Prior Learning**	g. Pre-test of existing skills or knowledge h. Draw concept map of current perceptions about topic i. Students summarize prerequisite knowledge and skills
Selective Perception	**4. Presenting Stimulus with Distinctive Features**	j. Multimedia introduction of knowledge and skills k. Content information presented in a storytelling format l. Subject matter expert as a guest presenter
Semantic Encoding	**5. Guided Learning**	m. Demonstrate skill or knowledge application n. Conduct experiment with teacher–student collaboration o. Use physical model to portray relationships
Response Organization	**6. Eliciting Performance**	p. Role play based on genuine scenarios q. Rehearsed simulation games r. Construct job aids displaying relevant skills
Reinforcement	**7. Providing Informative Feedback**	s. Peer critique during the instructional episode t. Suggest alternatives to achieve same results u. Provide "what if" questions
Activate Retrieval	**8. Assessing Performance**	v. Test of new knowledge and skill presented w. Learner fabricates alternatives to those presented x. Learner constructs summary of new information
Providing cues	**9. Enhancing Retention and Learning Transfer**	a. Hand out job aids relevant to the topic. b. Learners adopt a set of authentic examples. c. Recommend knowledge and skills required to succeed.

Fig. 3.1 Gagne's nine Events of Instruction[1]

[1] Adapted from Gagné, R. M., Wager, W. W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design*, 5th ed. United States: Thomson Wadsworth.

The reference for a learning episode is the performance objective. A single episode can have multiple objectives, but one objective per episode is recommended for beginner designers. Episodes can be combined as deemed appropriate. Figure 3.2 is an example of a learning episode based on Gagné's nine events of instruction.

An Example of a Learning Episode
Lesson Title: "Working as a Team"

Event	Instructional Strategy	Teacher or Student
Motivation	You, as the teacher, are the convener of an undergraduate student group that is about to form a team to work on a class project. The following ***fictional scenario*** occurred: *Fictional scenario: The last of the eight students arrive at the meeting wearing a T-shirt that says, "Club faggots, not seals." Another student says, if he stays, I'm leaving.* What should the teacher do?	Student: Form opinions about the scenario
Objective	Identify the roles and responsibilities of a project team in preparation for the initial client meeting according to Oriel's (1996) Team Handbook	Teacher: Inform the students that they will be expected to form a project team and choose a Project Manager
Prerequisite	Define major terms, concepts, and models related to project management	Student: Contribute to a brief class discussion about the terms, concepts, and models already learned about project management

Fig. 3.2 Sample lesson plan based on Gagné, R. M., Wager, W. W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design*, 5th ed. United States: Thomson Wadsworth

Content	**Introduction** A team is . . . *[insert content here]* Interpersonal skills and working as a team . . . *[insert content here]*	Teacher: Presents the topic information and other case scenarios about forming project teams
	Concept The conceptual framework for working as a team is based on stages of forming, storming, norming, performing and adjourning. Each stage . . . *[insert content here]* *Theory* Group dynamics theory . . . *[insert content here].* Conflict resolution theory . . . *[insert content here]* *Practice* Characteristics of constructive feedback and destructive feedback are manifested . . . *[insert content here] The* sample tools below facilitate the effective formation of work teams. *[Insert samples here]*	Student: Shares past experiences that relate to working as a member of some type of team Teacher: Directs student attention to content projected on the screen about concepts, theories, and practices associated with effective teaming exercises Student: Recall knowledge and skills already possessed about the topic Student: Determine the tasks that will require the most attention during the practice sessions
Guided Practice	Scrutinize the *Sample Case*	Teacher: Discuss a variety of reactions during different stages of team meetings

Fig. 3.2 (continued)

		Student: Recommend appropriate responses to personality conflicts and other challenges to the work of the project team
Independent Practice	Apply the appropriate knowledge and skills to the *Practice Case*	Student: Propose appropriate responses to the conflicts and challenges presented in a hypothetical situation
Feedback	Provide opportunity for each student to correct his or her answers	Teacher or Student: a. Suggest alternatives to achieve same results b. Provide "what if" questions
Assessment	Inform the student about her or his performance relative to the objective criteria	Teacher: Provide additional explanations about what most students got correct and the thing that was commonly mistaken
Closure	Summarize and reinforce the following ideas: • Different personalities are part of a team • Project goals should guide teamwork • Next step is project management plan	Student: Review the job aid distributed in class in preparation for the next episode

Fig. 3.2 (continued)

Practice Opportunity Review the sample case in Fig. 3.3 and change it to make it better.

Sample Case
Episode Title: Responsibility versus Authority

Event	Instructional Strategy	Teacher or Student
Motivation	True or False? Responsibility and Authority are the same	Teacher: Projects an image suggesting both terms are equal
Objective	Explain the concepts of responsibility and authority in terms of liability and consequences	Teacher: Restates the objective statement verbatim in a monotone voice
Prerequisite	The major phases of project management The importance of diversity to a project team While there is a single team leader for the project, every team member should be responsible for leading a sub-section of the project	Student: Brings a note from their academic advisor saying they are ready for this course
Content	Responsibility and authority are different. Responsibility and authority are often confused and sometimes treated the same, but they are different. Responsibility describes someone who has a duty or obligation, and capable of distinguishing between right and wrong, trustworthy and dependable. Authority is the right to determine, adjudicate, or otherwise settle issues and disputes, the right to control and command. Authority can be delegated, but responsibility cannot be delegated. Delegation is when an individual acts or represents others with the right to make final decisions in his or her	Teacher: Uses lecture notes to present the information in the column to the left

Fig. 3.3 Sample lesson plan based on Events of Instruction

	area of responsibility and remains accountable to his or her supervisor for the final results Without delegation of authority, there can be no progress. If authority is not delegated, progress ceases after growth to a certain point. Progress ceases simply because one person is only capable of controlling effectively a limited number of people depending on his or her position in chain of command. A good project manager should strive to excel regardless of his or her position in the chain of authority. He or she should recognize that authority could be delegated to his or her subordinates but never the project manager's responsibility Being a responsible person and being responsible for a particular incident are two different entities. This is not to say that in the event of a gross mistake or any particular error, which the person directly responsible for an action won't meet with certain consequences or reprimands or both Once a supervisor has delegated authority of another, he or she should cease to interfere with the subordinates under the person to whom this authority has been given. If authority is only delegated originally to accomplish a certain job, then the supervisor must follow up to see that the job is completed. Responsibility for completion is still the project manager's job	

Fig. 3.3 (continued)

	The project team consists of the full-time and part-time resources assigned to work on the deliverables of the project. The entire team is responsible for Understanding the work to be completed Planning out the assigned activities in more detail if needed Completing assigned work within the budget, time line, and quality expectations Informing the project manager of issues, scope changes, risk and quality concerns Proactively communicating status and managing expectations The project team can consist of human resources within one functional unit of an organization, or it can consist of members from several functional units. A cross-functional team has members from multiple units. The Project Manager is the team leader. The project manager and the team members of a project determine the success or failure of a project	
Guided Practice	Review each of the following roles and responsibilities and identify the responsibility and authority limits for each of the management roles: General Manager Client Project Manager Supplier End User	Teacher: Guides students through examples that are simple, consistent, and authentic Student: Ask questions about the similarities and differences of the roles and responsibilities presented by the teacher

Fig. 3.3 (continued)

Independent Practice	Compose a job description (200–400 words) for any of the following positions: Client Project Manager Functional Manager General Manager Program Manager Director	Student: Works independently to create job descriptions as guided by the teacher
Feedback	Provide opportunity for each student to revise his or her answers	Student: Consult with another student about the reasons for their descriptions
Assessment	Instructor judge objective achievement from the results of independent practice	Teacher: Provide an additional explanation about what most students missed
Closure	Distribute a job aid that describes the main duties of each stakeholder according to industry standards	Teacher: Ask to review the job aid before next class and introduce next class

Fig. 3.3 (continued)

Practice Opportunity Practice your knowledge and skills about *Generating Instructional Strategies* creating a single learning episode using the template in Fig. 3.4 based on Gagne's nine events of instruction and using the content from the Firefighter Case in Appendix A.

Practice Case

Event	Instructional Strategy	Teacher or Student
Gain Attention		
Objective		
Prerequisites		
Present the Content		
Guided Practice		
Independent Practice		
Feedback		
Assessment		
Closure		

Fig. 3.4 Template for generating evaluation lesson plan

Closure Each learning episode should have a distinct beginning, middle, and an end. Instructional strategies provide the direction for developing the remaining learning resources such as the media to support the intentional learning events, the formative evaluation activities, and the Pilot Test. Effective instructional episodes provide opportunities for students to practice the performances that will be expected of them at the conclusion of the course of study.

Select or Develop Media

Objective Select or develop media sufficient to accomplish the performance objective(s) as well as the remaining ADDIE procedures.

You Should Already Know A set of objectives.

Content

Introduction

> The best current evidence is that media are mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition.[2]

Whether you agree with the statement above or not, the position here is that effective media facilitates the construction and retention of knowledge and skills. Instructional media are intended to enrich the learning experience by using a variety of tangible items to facilitate the performance objectives.

Media should be chosen to support an instructional event. Do not choose instructional events to support a medium. All of the events of instruction should be mediated, although a single episode may have different types of media. Instructional media should facilitate student movement from

- Known to Unknown
- Easy to Difficult
- Simple to Complex
- Concrete to Abstract

[2] Clark, R. E. (1983). Reconsidering research on learning from media. Review of Educational Research, Winter, Volume 53, Number 4, page 445.

Media: ***Concept***

Medium = Singular **Media** = Plural

Instructional media are considered tools to extend the capability of the teacher and extend the capability of the student. The process for selecting existing media or developing new media is based on the context, expectations, performance conditions, available resources, culture, and practicality.

Media: ***Theory***

Select media for the following reasons. To

- Enhance the quality of learning episodes. Choose media for the specific purpose of enhancing the quality of the instruction
- Present and reinforce essential knowledge and skills. Media are commonly used to present content. Media also serves as tools for reinforcing key points so that the acquisition of learning is increased. Reinforcing information with different media offers additional opportunities to reinforce the learning without appearing repetitive to the learner
- Accommodate various learning styles. Learning style refers to a group of psychological traits that determine how an individual perceives, interacts within learning environments. There are many types of learning styles and a comprehensive discussion is beyond the scope of this episode; however, three common types of learning styles are noteworthy:
- Auditory
- Visual
- Kinesthetic

Auditory

The auditory learner retains information best if he or she not only hears the information but also has a chance to discuss the information (hear oneself repeat the information).

Visual

Visual students learn most through the visual sense. Such examples include use of pictures, real objects, illustrations, drawings, and video.

Kinesthetic

The kinesthetic learner gains knowledge and skills through the psychomotor sense. He or she needs to move or be part of the action. Media selections that provide the best learning environment for this group of learners includes working with mock-ups and simulators. Hands-on practice for this group aids retention.

Figure 3.5 provides an example of the supporting media for the learning episode "Working as a Team."

	Media that will be selected or developed to support the *Student*
Visual	• Whiteboard for making lists and storyboards • PowerPoint slides • Charts describing characteristics of project management • Video of professional project manager telling the real case stories • Handout with case scenarios
Auditory	• Audiotape recorder and blank tapes for students to record stories • Professional project management audiotapes • Peer discussion
Kinesthetic	• Storyboard for students to draw parts of the case scenarios • Videos of professional project manager with sound turned off to demonstrate gesturing and facial expressions • Physical Warm-up exercises • Video Camera for students to video themselves and others past experiences that relate to a team work

	Media that will be selected or developed to support the Type of Learning
Knowledge	• Handouts defining and showing the roles and responsibilities of project team • Team management books for reading a variety of case scenarios
Comprehension	1. Group discussion to help students identify the cons and pros for working as a team 2. Microsoft Word so that students can summarize their discussions
Application	a. Storyboard so that students can practice management planning b. Microsoft Word for students to make lists of planning phrases
Analysis	i. Inspiration Software to produce the story web as a method of analyzing scenario
Synthesis	a. PowerPoint slides for students to present the case scenario they have selected and learned
Evaluation	i. Team work rubric to give students guidelines for assessing other students' project management plan ii. Microsoft Word for case scenario reflection

Fig. 3.5. Example of supporters media

Media: Practice

The most important consideration is to choose the appropriate media that enables the learner to fulfill the performance objective. A general procedure for choosing instructional media:

First: Identify media that matches one or more components of the objective
Second: Indicate the media most appropriate for a specific instructional event

Figure 3.6 presents a sample episode that illustrates supporting media for each of Gagne's nine events of instruction.

An Example of a Learning Episode with Media Identified

Lesson Title: "Working as a Team"

Event	Instructional Strategy	Teacher or Student	Media
Motivation	You, as the teacher, are the convener of an undergraduate student group that is about to form a team to work on a class project. The following ***fictional scenario*** occurred: *Fictional scenario: The last of the eight students arrive at the meeting wearing a T-shirt that says, "Club faggots, not seals." Another student says, if he stays, I'm leaving.* What should the teacher do?	Student: Form opinions about the scenario	PowerPoint slide
Objective	Identify the roles and responsibilities of a project team in preparation for the initial client meeting according to Oriel's (1996) Team Handbook	Teacher: Inform the students that they will be expected to form a project team and choose a Project Manager	Class notes

Fig. 3.6 A sample episode that illustrates supporting media for each of Gagne's nine events of instruction[3]

[3] Sample lesson plan based on Gagné, R. M., Wager, W. W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design*, 5th ed. United States: Thomson Wadsworth.

Prerequisite	Define major terms, concepts, and models related to project management	Student: Contribute to a brief class discussion about the terms, concepts, and models already learned about project management	Class notes
Content	**Introduction** A team is . . . *[insert content here]* Interpersonal skills and working as a team . . . *[insert content here]* *Concept* The conceptual framework for working as a team is based on stages of forming, storming, norming, performing and adjourning. Each stage . . . *[insert content here]* *Theory* Group dynamics theory . . . *[insert content here].* Conflict resolution theory . . . *[insert content here]*	Teacher: Presents the topic information and other case scenarios about forming project teams Student: Shares past experiences that relate to working as a member of some type of team Teacher: Directs student attention to content projected on the screen, about concepts, theories, and practices associated with effective teaming exercises	Society for Human Resources Professionals URL Handouts with case scenarios PowerPoint slides

Fig. 3.6 (continued)

	Practice Characteristics of constructive feedback and destructive feedback are manifested . . . *[insert content here] The* sample tools below facilitate the effective formation of work *[Insert samples here]*	Student: Recall knowledge and skills already possessed about the topic Student: Determine the tasks that will require the most attention during the practice sessions.	
Guided Practice	Scrutinize the *Sample Case*	Teacher: Discuss a variety of reactions during different stages of team meetings Student: Recommend appropriate responses to personality conflicts and other challenges to the work of the project team	Handout with case scenario
Independent Practice	Apply the appropriate knowledge and skills to the *Practice Case*	Student: Propose appropriate responses to the conflicts and challenges presented in a hypothetical situation	Hypothetical, yet realistic, practice case

Fig. 3.6 (continued)

Feedback	Provide opportunity for each student to correct his or her answers	Teacher or Student: dd. Suggest alternatives to achieve same results ee. Provide "what if" questions	PowerPoint slides
Assessment	Inform the student about her or his performance relative to the objective criteria	Teacher: Provide additional explanations about what most students got correct and the thing that was commonly mistaken	Class notes
Closure	Summarize and reinforce the following ideas: • Different personalities are part of a team • Project goals should guide teamwork • Next step is project management plan	Student: Review the job aid distributed in class in preparation for the next episode	Project management job aid

Fig. 3.6 (continued)

Practice Opportunity Review the Sample Case in Fig. 3.7 and change the "Media" column to make the overall lesson better.

Sample Case
Episode Title: Responsibility versus Authority

Event	Instructional Strategy	Teacher or Student	Media
Motivation	True or False? Responsibility and Authority are the same	Teacher: Projects an image suggesting both terms are equal	Lecture
Objective	Explain the concepts of responsibility and authority in terms of liability and consequences	Teacher: Restates the objective statement verbatim in a monotone voice	Role Play
Prerequisite	1. The major phases of project management 2. The importance of diversity to a project team 3. While there is a single team leader for the project, every team member should be responsible for leading a sub-section of the project	Student: Brings a note from their academic advisor saying they are ready for this course	Multiple choice test

Fig. 3.7 Sample case

Content	Responsibility and authority are different. Responsibility and authority are often confused and sometimes treated the same, but they are different. Responsibility describes someone who has a duty or obligation, and capable of distinguishing between right and wrong, trustworthy and dependable. Authority is the right to determine, adjudicate, or otherwise settle issues and disputes, the right to control and command. Authority can be delegated, but responsibility cannot be delegated. Delegation is when an individual acts or represents others with the right to make final decisions in his or her area of responsibility, and remains accountable to his or her supervisor for the final results Without delegation of authority, there can be no progress. If authority is not delegated, progress ceases after growth to a certain point. Progress ceases simply because one person is only capable of controlling effectively a limited number of people depending on his or her position in chain of command. A good project manager should strive to	Teacher: Uses lecture notes to present the information in the column to the left	Notes written on a dry marker board

Fig. 3.7 (continued)

	excel regardless of his or her position in the chain of authority. He or she should recognize that authority could be delegated to his or her subordinates but never the project manager's responsibility Being a responsible person and being responsible for a particular incident are two different entities. This is not to say that in the event of a gross mistake or any particular error, which the person directly responsible for an action won't meet with certain consequences or reprimands or both Once a supervisor has delegated authority of another, he or she should cease to interfere with the subordinates under the person to whom this authority has been given. If authority is only delegated originally to accomplish a certain job, then the supervisor must follow up to see that the job is completed. Responsibility for completion is still the project manager's job The project team consists of the full-time and part-time resources assigned to work on the deliverables of the project. The entire team is responsible for Understanding the work to be completed		

Fig. 3.7 (continued)

	Planning out the assigned activities in more detail if needed Completing assigned work within the budget, time line, and quality expectations Informing the project manager of issues, scope changes, risk, and quality concerns Proactively communicating status and managing expectations The project team can consist of human resources within one functional unit of an organization or it can consist of members from several functional units. A cross-functional team has members from multiple units. The Project Manager is the team leader. The project manager and the team members of a project determine the success or failure of a project		
Guided Practice	Review each of the following roles and responsibilities and identify the responsibility and authority limits for each of the management roles General Manager Client Project Manager Supplier End User	Teacher: Guides students through examples that are simple, consistent, and authentic Student: Ask questions about the similarities and differences of the roles and responsibilities presented by the teacher	Overhead Projector

Fig. 3.7 (continued)

Independent Practice	Compose a job description (200–400 words) for any of the following positions: Client Project Manager Functional Manager General Manager Program Manager Director	Student: Works independently to create job descriptions as guided by the teacher	Handouts
Feedback	Provide opportunity for each student to revise his or her answers	Student: Consult with another student about the reasons for their descriptions	Handouts
Assessment	Instructor judge objective achievement from the results of independent practice	Teacher: Provide an additional explanation about what most students missed	Index Cards
Closure	Distribute a job aid that describes the main duties of each stakeholder according to industry standards	Teacher: Ask to review the job aid before next class and introduce next class	A URL for a web site related to the topic

Fig. 3.7 (continued)

Practice Opportunity Practice your knowledge and skills about *Selecting or Developing Media* creating a single learning episode using the template in Fig. 3.8 based on Gagne's nine events of instruction and using the content from the Firefighter Case in Appendix A.

Practice Case

Event	Instructional Strategy	Teacher or Student
Gain Attention		
Objective		
Prerequisites		
Present the Content		
Guided Practice		
Independent Practice		
Feedback		
Assessment		
Closure		

Fig. 3.8 Template for identifying media to be selected or developed

Closure Each episode of intentional learning should be mediated. Instructional media should facilitate student movement from known to unknown; from easy to difficult; from simple to complex; and from concrete to abstract. Choose media to facilitate each instructional event. Avoid using instructional events to accommodate a particular medium.

Develop Guidance for the Student

Objective Provide information to guide the student through the instruction.

You Should Already Know
1. All of the instructional strategies
2. All of the media that will be required to support the learning episodes

Content

Introduction

The term student in this book refers to learners who have accepted the role of novice within a complex intentional learning situation. The student is complex because of the physical, emotional, social, and mental experiences he or she contributes to the learning space. An intentional learning situation is further complicated by the effect of intelligence, cognitive styles, motivation, cultural norms, creativity, and socioeconomic status have on behavior patterns during teaching and learning sessions.

> The purpose of instruction is to help people learn. Can learning occur without instruction? Certainly. We are continuously encountering and interpreting our environment and the events in it. Learning is a natural process that leads to changes in what we know, what we can do, and how we behave. However, one function of an educational system is to *facilitate intentional learning*, . . . [4]

Providing guidance for navigating the instructional strategies enhances the learning experience. The format of the guiding artifact will vary depending on the instructional goals and the primary delivery system.

---

[4] Gagné, R. M., Wager, W. W., Golas, K. C., & Keller, J. M. (2005). Principles of instructional design, 5th ed. United States: Thomson Wadsworth.

Guidance for the Student: Concept
Students can focus better on the learning tasks when informed about what to expect.

Guidance for the Student: Theory
The basic theory for developing guidance for the student is that of *advance organizer*. An *advance organizer* is an overview of the information that will follow. There are variations for developing guidance for the student. Consider these guiding questions:

i. Do the episodes of intentional learning have an orderly flow?
ii. Does each learning episode have a logical sequence?
iii. Does one part of an instructional strategy transition smoothly into the next part of the instructional strategy?
iv. Does the sequence of content for the student follow the same sequence of content for the teacher?

While there are many ways to frame guiding information for the student, this section focuses on three common types of guiding information:

a. Organization
b. Format
c. Quality

Guidance for the Student: Practice

Organization

i. Title Page
ii. Copyright
iii. Acknowledgments Page
iv. Table of Contents
v. Body
vi. Glossary
vii. Appendix

Title Page

The Title Page announces the training program also sets the stage for what is to come. The title page should be carefully designed for visual appeal because it may be the first thing the participants see when they enter the training environment. The

Title Page is likely to include a graphic symbol or drawing that illustrates the topic especially when it is used as a cover page.

Copyright

Learning materials may or may not include a copyright page; ensure that you know and use the current departmental or company-wide guidelines for copyright designation. The second page is a common place for establishing copyright.

Acknowledgments

The second page is sometimes used for acknowledgments of the team members (including SMEs) who participated on the project. Acknowledgments recognize those who participated in the development of the training, it also provides a "paper trail" to those developers so that they may be contacted for questions or revisions.

Table of Contents

A table of contents is a useful reference tool in any documents over 20 pages in length.

Body

The largest structural component is the body of the Guide, where the content and exercises for each module or section are placed.

Glossary

A glossary that provides a common meaning is a valuable addition to the Guide if the training uses a number of terms that are new to the learner or often misunderstood.

Appendix

The Appendix is an ideal location for placement of items that will change frequently, for example, those that have current

specifications, data, or dates on them. If the item requires more frequent updating than the rest of the Learner Guide, then it should be placed in the Appendix, which is conveniently positioned at the back of the Guide.

Format

Consider the following aspects of module development:

i. Content presentation
ii. Exercise presentation
iii. Sequence within the module

Content Presentation

Every module or section presents the main content. It should be written using the same guidelines as other writing; it should have

a. a beginning or introduction to the topic
b. a middle or explanation of new content
c. examples used to illustrate the content
d. exercises where the participants will practice the new skill
e. an ending or summary to the topic

Exercise Presentation

i. Clearly written directions
ii. Place for responses (if applicable)
iii. Place for taking notes

Sequence

The sequence within the module should be consistent from one module to another for ease of use.

Quality

The quality of the Learner Guide is reflected in the structure and module format as well as the guide's layout and design. However, within this category (Quality) the focus will be on the following elements:

1. Clarity
2. Accuracy
3. Consistency

Clarity

1. Is the writing clear?
2. Is it easy to understand?
3. Can you follow the exercise directions?
4. Is the reading level appropriate for the audience?
5. Is jargon minimized and carefully defined?
6. Are new terms defined?
7. Are all acronyms identified when first presented in the text?

Accuracy

- Is the grammar usage correct?
- Is the spelling correct?
- Is the punctuation correct?

Consistency

1. Are the modules consistent in structure from one to another (Does each have an introduction and summary, for example?)?
2. Are the modules consistent in layout and design (Does each module have the same size and position for the various headings, for example?)?

Practice Opportunity Review the Sample Case in Fig. 3.9 and change the "Table of Contents" intended for the student to make it better.

Sample Case

Table of Contents Intended for the Students

Water Conservation Unit — Table of Contents

Fig. 3.9 Sample Case

Practice Opportunity Practice your knowledge and skills about *Developing Guidance for the Student* creating a Table of Contents for the student using the space in Fig. 3.10 and using the content from the Firefighter Case in Appendix A.

Practice Case

Table of Contents Intended for the Student

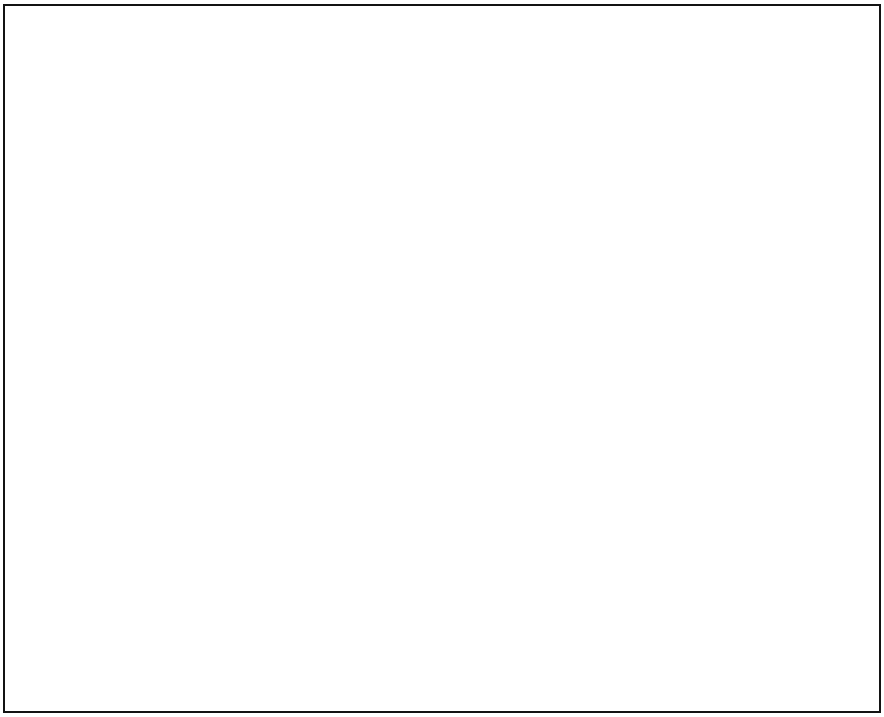


Fig. 3.10 Space to practice developing guidance for the student

Closure Provide organizing information in advance of beginning the episodes of intentional learning.

Develop Guidance for the Teacher

Objective Provide information to guide the teacher as she or he facilitates the episodes of intentional learning.

You Should Already Know All of the instructional strategies
All of the media that will be required to support the learning episodes

Content

Introduction

The teacher's role is to move *from* being the "Sage on the Stage" *to* the *Guide on the Side*. Artifacts that guide the teacher are often the vehicles that define the quality of the entire instruction. Guiding artifacts reflect the designer's selection of tasks to be performed by the students, definition of objectives to be fulfilled, selection of instructional strategies, and determine the pace of instruction.

Guidance for the Teacher: Concept

This section focuses on the elements that enable the teacher to guide the student through the planned instructional strategies. There are two main differences between *Student Guide* the *Teacher Guide*:

1. Less blank space is required on the documents devoted to guiding the teacher
2. Graphics are more useful when providing symbols or icons that provide guidance to teachers in facilitating the instruction

Layout and design enhance the ability of the teacher to facilitate the instruction. Clarity, icons for quick reference, and consistency in layout and design all assist the teacher in providing a smooth flow to the course.

Guidance for the Teacher: Theory

The same categories of development that form the guidance for the student also form the guidance for the teacher. However, guidance for the teacher serves a different purpose. While student guides aid the student in learning, the teacher guides aid the facilitator in leading students through the instructional strategies.

Guidance for the Teacher: Practice

The structure of artifacts used to guide the teacher is similar to the artifacts used to guide the student, except additional sections exist. The following sections are added to provide guidance for the teacher:

A "How to Use This Guide" section
Symbols or icons that direct the facilitator to take specific actions
Points of emphasis
Leading questions
Answers to leading questions
Examples
Directions for when and how to use media
Directions for exercises
Debrief questions for every exercise
Special directions
Times for each section or exercise
Tips about learner characteristics, resources suggested, prerequisites
Suggestions for handling potential challenges

The organization for the Table of Contents for the Teacher (Fig. 3.11) is similar to the Table of Contents for the student, *but adds several sections*:

Title Page
Copyright
Acknowledgments Page
Table of Contents
How to Use this [Artifact]
Revisions and Updates
Special Instructions
Symbols and Icons Legend
Body
Glossary
Appendix

Sample Case

Table of Contents Intended for the Teacher

Table of Contents

Fig. 3.11 Practice case

Practice Opportunity Practice your knowledge and skills about *Developing Guidance for the Teacher* creating a Table of Contents for the teacher using the space in Fig. 3.12 and using the content from the Firefighter Case in Appendix A.

Practice Case

Table of Contents Intended for the Teacher

Fig. 3.12 Space to practice developing guidance for the teacher

Closure Provide facilitating information in advance of beginning the episodes of intentional learning.

Conduct Formative Revisions

Objective Revise the instructional products and processes prior to implementation.

You Should Already Know That all of the learning resources at various stages of draft form are available for trials.

Content

Introduction

Stufflebeam once said, "The purpose of evaluation is to improve rather than prove."[5] Instructional Designers use evaluation for the specific purpose of improving the designed instruction so that it can fulfill its goal of reducing the performance gap. There are two main types of evaluation used in the ADDIE approach: (1) Formative Evaluation and (2) Summative Evaluation.

Formative Evaluation

Formative Evaluation is the process of collecting data that can be used to *revise* the instruction *before implementation*.

Summative Evaluation

Summative Evaluation is the process of collecting data following implementation.

Summative evaluation will be discussed in a later section. This episode focuses on *Formative Evaluation*.

The purpose of *Formative Evaluation* is to determine the potential effectiveness of learning resources under development and to identify any learning resources or parts thereof that need to be revised. Formative evaluation also provides opportunities to ascertain student attitudes toward the learning resources and the potential effectiveness of the learning resources.

Conduct Formative Revisions: Concept

Formative Evaluation occurs throughout the ADDIE process. Formative evaluation:

- Initiates the instructional design process
- Permeates the entire instructional design process
- Concludes the develop phase
- Guides post-development procedures

[5] [Need full Stufflebeam quote here.]

Conduct Formative Revisions: Theory

Formative evaluation in instructional design can be defined as collecting data about how students learn within certain contexts. The data are analyzed and synthesized into meaningful information. Revisions are made based on the data summaries. Performance objectives are the criteria for collecting formative evaluation data. Common data sources include

Individual Item Analysis
Embedded Test Item
Pre-tests
Post-tests
Attitude Questionnaire
Observation

Conduct Formative Revisions: Practice

There are three typical phases of *Formative Evaluation*:

1. One-to-One Trial
2. Small Group Trial
3. Field Trial

One-to-One Trial

The first phase of formative evaluation is the One-to-One trial. The goals of One-to-One trials are to remove the most obvious errors from the planned episodes of intentional learning and the supporting learning resources and obtain initial reactions from stakeholders in the ADDIE process.

Criteria can be established to determine how clear the message is to the stakeholders, and how feasible the instruction is given the time limits or other parameters. This is also a good time to ascertain the potential impact that the planned learning episodes might have on the students' attitudes and the students' perceptions about the value of the instructional goals. One-to-One trials are conducted with individuals of varying ability levels and individuals who likely have varying reasons for participating in the planned course of study. The instructional designer or developer often sits with the individual and obtains feedback as the learner reviews the material. The data are often more qualitative than quantitative during the one-to-one trials and are used to remove the most obvious errors as well as many small ones that are discovered. The instructional developers revise the learning resources based on the data collected during the one-to-one trials and then proceed to conduct small group trials.

Small Group Trial

Small group trials are used to determine the effectiveness of the *revised* instruction and to obtain feedback on the learning resources in their final form. Small group trials include scores on pre-tests and post-tests as well as interviews and questionnaires. The optimum number of a small group can be between 8 and 20. Although the term used to describe the trial is small group, the context should approximate the intended instructional setting.

Quantitative and descriptive information are used to provide feedback from the Small Group Trial. The data are then summarized and used to make revisions. The instructional developers continue making revisions to the learning resources based on the data generated through small group trials prior to the field trials.

Field Trial

The field trial is the final stage of formative evaluation. The purpose of the Field Trial is to determine whether the instruction can be utilized in the intended context. Decisions made as a result of the field trial include whether the student's performance will be adequate to move to the implementation phase and whether the delivery system planned for the instruction strategies is feasible.

There are two common categories of Field Trials:

Non-credit Field Test

Credit-bearing Pilot Test

A non-credit Field Test indicates that the finished instruction is not yet guaranteed to be at the level at which one could give credit or certification that participants have met the objectives. The credit-bearing Pilot Test is the last step in the Development phase and covered in the next section of this chapter.

Practice Opportunity Review the *Formative Revisions Summary* for the Sample Case in Fig. 3.13. Consider ways to improve the quality of the information so that effective formative revisions can be made.

Sample Case
Hypothetical Summary of Formative Revisions

Component	Problem	Data Source	Revision Decision
Purpose	• Too broad • Focused some on lack of resources, rather than exclusively on lack of knowledge and skills	• External reviewers • Project manager • Program manager	• Reduced the scope of the purpose statement • Increased the congruency to the portion of the gap attributable to a lack of knowledge and skills
Goals	• Original list of 22 goals • Too specific	• Other teachers • Peer designers	• Combined original 22 goals down to a list of 7 goals • Focused on main categories of learning
Objectives	• Approximately 10% did not match the corresponding task • Approximately 10% had insufficient prerequisites identified	• Past students • Potential students • Peer designers • One-to-one trials	• Increased fidelity between learning tasks and the performance objectives • Adjusted prerequisite tasks

Fig. 3.13 Sample formative evaluation summary

Prerequisites	• Insufficient for middle goals	• Past students • Potential students • Peer designers • One-to-one trials	• Added prerequisites • Adjusted prerequisites
Instructional Strategies	• Practically all activities confined to within the walls of a physical classroom	• Past students • Potential students • One-to-one trials • Small group trials	• Replaced several in-class activities with out-of-class activities
Testing Methods	• Mostly paper and pencil exercises	• One-to-one trials • Small group trials • Field trials	• Incorporated more kinesthetic activities
Information to Guide the Leather	• Designed more for instructor-led course while the course is actually delivered online	• Subject matter expert • Small group trials • Students	• Changed the Table of Contents to a *Site Map*
Information to Guide the Facilitator	• Designed for an experienced instructor while novice instructors are likely to be the teachers	• Peer designers • Small group trials • Field trials	• Added more directions for the teacher • Added more supplemental resources
Supporting Media	• Authentic items caused planned instruction to exceed budgeted cost	• Media experts • Small group trials • Peer designers • Project manager	• Revised corresponding objective • Revised corresponding test item • Substituted 20% of genuine items with simulated artifacts

Fig. 3.13 (continued)

Practice Opportunity Practice your knowledge and skills about *Summarizing Formative Revision Data* completing the table in Fig. 3.14 and using the content from the Firefighter Case in Appendix A.

Practice Case

Summary of Formative Revisions Template

Component	Problem	Data Source	Revision Decision
Purpose			
Goals			
Objectives			
Prerequisites			
Instructional Strategies			
Testing Methods			
Information to Guide the Learner			
Information to Guide the Facilitator			
Supporting Media			

Fig. 3.14 Template for providing formative evaluation summary data

Closure Provide a summary of the revisions made prior to implementation.

Conduct a Pilot Test

Objective Undertake a Field Trial for credit as the final stage of the formative evaluation stage.

You Should Already Know That the results of the one-to-one trials were used to revise the learning resources in preparation for the small group trials.

The results of the small group trials were used to revise the learning resources in preparation for the field trials.

The results of any non-credit-bearing field trials were used to revise the learning resources prior to conducting a Pilot Test.

Content **Introduction**

Because ADDIE is an iterative process (nonlinear), the topic of Evaluation reasserts itself, once again, into the process. Evaluation in ADDIE can be defined as collecting data about how students learn specific content under varying instructional conditions, analyzing those data, and synthesizing the data into meaningful information that can be used to make decisions about the process and the instructional products.

Formative Evaluation is the process of collecting data that can be used to *revise* the instruction *before implementation*, thus making the instruction more effective. A *Pilot Test* is an example of Formative Evaluation.

Summative Evaluation is the process of collecting data following implementation (of at least one training class/event) in order to determine its effectiveness (how well it satisfies the instructional goals).

Students who participate in the Pilot Test are expected to meet all of the objectives in the instruction. Therefore, Pilot Test participants receive credit and are not expected to repeat the course.

Procedure for Conducting a Pilot Test

a. The students in the Pilot Course should represent the exact same group of students for which the course was designed.
b. A facilitator should lead the instruction from the identified facilitator group. (The designer should not play this role; the designer should observe the process.)

c. The client (or person who has the final decision as to the recommendation for implementation) should observe the Pilot Test.

Data Collection
Like the small group trial, data are collected on learner achievement and attitude, instructor procedures and attitudes, and resources such as time, space, and equipment. Data are supplied from the following sources:

Pilot instructor debriefings
Observation
Participant interviews
Embedded test scores
Post-test scores

Data Analysis
The collected data should be grouped across learners, and then displayed graphically such as through an instructional analysis diagram or concept map. It should reflect an overall picture of the instruction, organized by objective. Summarizing the data in this format helps to locate areas where the instruction was not effective.

Formative Revisions
Any revisions prior to implementation should be based on the data collected as well as your own experience in the instructional systems design process. You may notice some minor problems during the Pilot Test that other observers, less sophisticated in the instructional systems design process, don't. Using reliable learning principles, make any final adjustments before implementation.

Evaluation Team
Those who participate in the evaluation consist of the following:

Instructional development group
External review panel
Representative from management

The evaluation team generates a Pilot Test Report.

Role of Management
It must be remembered that one of the main purposes of the Pilot Test is to determine whether to proceed with implementation of the instruction as planned. Whatever the instructional development group or evaluation team recommends, it must be remembered that management renders the final adoption decision.

Components of a Pilot Test Plan
To implement a Pilot Test, you would first prepare a Pilot Test Plan. The typical components of a Pilot Test Plan include

Participant Description
Prerequisites
Location, Date, Time
Learning Environment
Facilitator Qualifications
Measurement Plan
Evaluation Team Description

Participant Description
Describe the total number of participants in the proposed Pilot Test, number of groups of participants, and any defining characteristics such as specific occupations.

Prerequisites
Describe the prerequisites that the learners are expected to bring with them to the instruction.

Location, Date, Time
Describe the location where the Pilot Test will take place. Provide the length of time for which the instruction is scheduled and dates when each module will be piloted.

Learning Environment
Describe the learning environment for which the Pilot Test is planned including technological and institutional resources required.

Facilitator Qualifications
Describe the qualifications needed by the facilitator.

Measurement Plan
Describe what you will measure and how it will be measured. Include a copy of the measurement instruments you will use including debrief questions.

Evaluation Team Description
List the Evaluation Team members. Describe each person's role and responsibilities.

Result: Learning Resources

The result of the Develop phase is selected Learning Resources. Common learning resources available or developed by the end of this phase are:

1. Lesson plans
2. Sources for additional content
3. Instructional strategies
4. Selected media to facilitate the learning process
5. A comprehensive set of directions that will offer guidance to the teacher as he or she interacts with the students during the course of the planned instruction
6. A comprehensive set of directions for each instructional episode and independent activities that facilitate the student's construction of knowledge and skills
7. A summary of significant revisions
8. The results of a pilot test

During the meeting where the Learning Resources are presented to the client, usually one of two things happen: (A) the client requests additional formative evaluation data or (B) the client is satisfied. If the client request additional formative evaluation data, repeat the necessary components of the design and develop phases, and prepare a revised formative evaluation summary and revised learning resources as appropriate. If the client is satisfied, then obtain the appropriate endorsements and proceed to the Implement phase.

	Analyze	**Design**	**Develop**	**Implement**	**Evaluate**
Concept	Identify the probable causes for a performance gap	Verify the desired performances and appropriate testing methods	Generate and validate the learning resources	Prepare the learning environment and engage the students	Assess the quality of the instructional products and processes, both before and after implementation
Common Procedures	1. Validate the performance gap 2. Determine instructional goals 3. Confirm the intended audience 4. Identify required resources 5. Determine potential delivery systems (including cost estimate) 6. Compose a project management plan	7. Conduct a task inventory 8. Compose performance objectives 9. Generate testing strategies 10. Calculate return on investment	11. Generate content 12. Select or develop supporting media 13. Develop guidance for the student 14. Develop guidance for the teacher 15. Conduct formative revisions 16. Conduct a Pilot Test	17. Prepare the teacher 18. Prepare the student	19. Determine evaluation criteria 20. Select evaluation tools 21. Conduct evaluations
	Analysis Summary	***Design Brief***	***Learning Resources***	***Implementation Strategy***	***Evaluation Plan***

Chapter 4
Implement

Contents

Abstract The purpose of the Implement phase is to prepare the learning environment and engage the students. The common procedures associated with the Implement phase are to prepare the teacher and to prepare the student. Upon completion of the Implement phase, you should be able to move to the actual learning environment where the student can begin to construct the new knowledge and skills required to close the performance gap. The Implement phase indicates the conclusion of development activities and the end of formative evaluation. Most ADDIE approaches use the Implement phase to transition to summative evaluation activities and other strategies that place into action the teaching and learning process. The result of this phase is an Implementation Strategy. Common components of an implementation strategy are a learner plan and a facilitator plan. During the client meeting where the Implementation Strategy is delivered, the emphasis should be about ways to shift the work from the design team to the people who will actually administer the course of study.

Keywords Implement · Lesson plan · Strategy · Design team · Instructional design · Interaction · Learning environment · Summative evaluation

Introduction to Implement

The purpose of the Implement phase is to prepare the learning environment and engage the students. The common procedures associated with the Implement phase are the following:

17. Prepare the teacher
18. Prepare the student

R.M. Branch, *Instructional Design: The ADDIE Approach*,
DOI 10.1007/978-0-387-09506-6_5, © Springer Science+Business Media, LLC 2009

Upon completion of the Implement phase, you should be able to move to the actual learning environment where the student can begin to construct the new knowledge and skills required to close the performance gap. The Implement phase indicates the conclusion of development activities and the end of formative evaluation. Most ADDIE approaches use the Implement phase to transition to summative evaluation activities and other strategies that place into action the teaching and learning process. The result of this phase is an Implementation Strategy. Common components of an implementation strategy are the following:

1. Learner Plan
2. Facilitator Plan

During the client meeting where the Implementation Strategy is delivered, the emphasis should be about ways to shift the work from the design team to the people who will actually administer the course of study. If the client is satisfied, then obtain the appropriate endorsements and proceed to the Evaluate phase. The remainder of this chapter is devoted to the common procedures of the Implement phase.

Prepare the Teacher

Objective Identify and prepare teachers to facilitate the instructional strategies and the learning resources that have been newly developed.

You Should Already Know All of the learning resources have undergone formative evaluation and the requirement for the potential teachers, instructors, and trainers has been identified.

Content Preparing the teacher is a procedure within the Implement Phase of ADDIE. The planned instruction is currently undergoing formative evaluation. Formative revisions are being made with input from all of the stakeholder groups. The knowledge and skills required for someone to facilitate the instruction and the learning resources are becoming increasingly clear. The role of the teacher is to serve as the primary facilitator in the intentional learning environment. The teachers who will be responsible for facilitating the instruction should be identified. Selected teachers should already possess the basic facilitation skills for the content area. However, teachers also need to be identified and prepared for the nuances and unique aspects of the newly developed instruction.

The teacher's role is extremely important within any instructional delivery system. The teacher is responsible for facilitating the course, setting the pace, providing guidance and assistance, furnishing subject matter expertise, and assisting in assessment and evaluation.

One component of the *Prepare the Teacher* procedure is a Facilitator Plan. The Facilitator Plan is comprised of three parts:

1. Identification
2. Schedule
3. Train the Trainer

Identification

The person responsible for selecting the facilitators will use the Facilitator Plan to identify and schedule qualified teachers to facilitate the instruction. Teacher qualifications were initially defined during the Analyze phase; however, it is necessary to repeat the qualifications and add any new prerequisites for the teacher as part of the Facilitator Plan as a result of developing the learning resources and the results of the formative evaluation.

Some courses of study may actually require teachers to be certified as a facilitator in some way. While general certification is a separate process beyond the scope of this text, a properly developed train-the-trainer course can also serve to certify a teacher to facilitate a designated course of study.

Schedule

A schedule is prepared showing when and where individual teachers will be prepared. Such a schedule is often referred to as the Train-the-Trainer course. A date is determined for conducting the Train-the-Trainer course. Teachers who have been selected to facilitate the newly developed instruction are scheduled to complete a Train-the-Trainer course.

Train the Trainer

The administrator or manager responsible for coordinating the implementation of the newly developed course of study should notify the selected teachers [facilitators or trainers] about instructional schedules, including course name and identification number, and the Train-the-Trainer course. Prerequisites for the teacher should be completed by the teacher

and confirmed prior to the teacher's arrival at the Train-the-Trainer course.

Train the Trainer

A Train-the-Trainer course should be developed to meet the specific needs of the teachers to serve in their role as facilitator. The most effective Train-the-Trainer courses include opportunities for practicing the facilitation of the newly developed instruction, such as Microteaching, where each teacher has an opportunity to tryout their facilitation skills and record those sessions for critique by their peers, themselves, and their supervisors with the expressed purpose of demonstrating improvements during subsequent trials. Train-the-Trainer courses provide opportunities for teachers to

i. Review the original performance gap
ii. Acquire additional expertise in the content area, if necessary
iii. Practice facilitating the newly developed instructional strategies
iv. Practice using the newly developed learning resources
v. Prepare for managing potential challenges
vi. Obtain certification [if appropriate]

There are practically an infinite number of formats for a Train-the-Trainer course. However, an effective Train-the-Trainer course usually provides an opportunity for all participants to actively practice all aspects of the newly developed instruction. Furthermore, the most effective train-the-trainer courses tend to leave room for the participants to incorporate their own personal examples and current successful strategies from within a community of practitioners. The following three descriptions represent the spectrum of formats that typically frame a Train-the-Trainer course. There is no one best format for all train-the-trainer situations; therefore, use the best format, or combination thereof, to meet the specific needs of your context.

Train-the-Trainer Course Format #1 (three parts)

Part A

The teachers participate in a training event taking the role of students. The instructor for the Train-the-Trainer course is the lead instructional designer.

Part B
The Train-the-Trainer instructor describes the learner profile, shares relevant information from the Analyze phase, and conducts a Q&A session where teachers discuss strategies for facilitating the newly developed instruction. Teachers review the Guidance for the Teacher materials.

Part C
Each teacher is given one or more lessons to present in a Microteaching episode. The remaining teachers take the role of students during these Microteaching episodes.

Train-the-Trainer Course Format #2 (four parts)

Part A
Pre-work: All teachers are provided with the materials for guiding the teacher and for guiding the student and are required to review the materials prior to attending the Train-the-Trainer course.

Part B
The learner profile and analysis summary are provided. The course goals and objectives are presented.

Part C
All of the instructional materials developed to date are provided for each teacher participating in the Train-the-Trainer course.

Part D
Exercises are assigned for the Train-the-Trainer course that help the teachers integrate knowledge about the course. Examples of typical exercises include the following:

Sample Exercise 1

Assign teaching teams. Each team of teachers evaluates all of the class notes and presents the following to the rest of the group:

- Alignment of Goal-Task-Objective-Test Item
- Main teaching points for the lesson
- Potential barriers to *learning*
- Potential barriers to *teaching*
- Recommendations for overcoming potential barriers

Sample Exercise 2

Teaching teams review all of the class notes and identify

- A time line of the major parts of the module
- Instructional events that are likely to require special attention

Sample Exercise 3

Teaching teams review all of the class notes and identify additional

- Examples
- Illustrations
- Metaphors

Sample Exercise 4

Teaching teams review all of the class notes and identify any other strategies that have the potential to close the original performance gap.

Train-the-Trainer Course Format #3 (three parts)

Part A

Describe relevant parts of the analysis summary and learner profile.

Part B

Have the teachers assume the role of students. The lead designer provides parts of the instruction.

Part C

The teachers then assume the role of facilitator. The lead designer provides a "walk-through–talk-through" of the instructional materials. The group discusses the progression of the instruction as facilitators follow the flow. Questions are discussed as they are raised.

Practice Opportunity Carefully scrutinize the *Facilitator Plan* for the *Sample Case* and revise accordingly

Sample Case
Facilitator Plan

(The Facilitator Plan presented in this example is unacceptable. Review and revise)

Identification	The teacher will have • An in-depth knowledge of the Project Management process • An in-depth knowledge of the Change Management process • Experience
Schedule	Train-the-Trainer course will be conducted in Atlanta in a classroom that contains • Computer with Internet access • LCD projector • Projection screen • Video camera/tripod • Flip charts • Colored markers Train-the-Trainer course will be conducted 2 weeks following the Pilot Test and approximately 4 weeks prior to first class. The Agenda for the Train-the-Trainer course is attached. Pilot Test: August 03–04, 2010. Initial Course Start: August 17–18, 2010 Train the Trainer: September 03–04, 2010

Train-the-Trainer	Each Teacher should • Review the facilitator guide and learner guide • Feel good about operating all equipment in classroom • Attend the Train-the-Trainer course The purpose of the training is to develop skills and incorporate Change Management process (acceptance of change) as part of the Project Manager's accountability. • Prerequisites for class will be sent 5 days prior to class participates will be sent an e-mail reminder. The students for this course are Project Managers I, Project Managers II, and Senior Project Managers. Upon completion of the Train-the-Trainer course the students will be able to • Provide a clear definition of Change Management • Promote consistent use of terminology when discussing change principles • Create awareness of the Change Management process and tools • Realize that change management is often the most challenging aspect of a successful project • Integrate the critical components of Change Management into the current Project Managers Process • Recognize to what degree Change Management is required • Assess the customers willingness to accept change

Train-the-Trainer Agenda	
Time	**Topic**
20 min	Introduction
30 min	Review Goals and Objectives
30 min	Review Course Outline Outline will include required topics that must be met in the training and time frames to be spent on each
3.5 h	Perform an informal run-through of the class, allowing time for questions from facilitators. One of the teachers participating on the Train-the-Trainer course will highlight key points
1.5 h	A non-jeopardy teach-back session is conducted in which each facilitator presents one episode of the course. The group will provide feedback
30 min	Closure: General questions and answers session
Total time: 7 h with time for lunch/breaks	

Practice Opportunity Generate a Train-the-Trainer Agenda for the *Firefighter Case* located in Appendix A.

Practice Case
Train-the-Trainer Agenda

Firefighter Train-the-Trainer Course		
Topic	Time	Content
Day 1		
Introduction		
Overview of Instructional Development Process		
Break		
Review Goals and Objectives		
Lunch		
Validation of Facilitator Qualifications		
Break		
Preview Guidance for the Student		
Preview Guidance for the Teacher		
Adjourn		

Day 2		
Review Day 1 Activities		
Microteaching Session		
Break		
Microteaching Session		
Lunch		
Media Refinement Discussion		
Break		
Evaluation Plan		
Course Administration		
Closing Remarks		
Adjourn		

Closure A Facilitator Plan that includes a Train-the-Trainer course should increase the probability of closing the performance gap. The *Facilitator Plan* is incorporated into the *Implementation Strategy*. The *Implementation Strategy* is used by

1. The client to remain informed about the preparation prior to implementation
2. Those responsible for scheduling courses
3. Those responsible for maintaining student records
4. Those responsible for evaluating the
    a. Learning resources
    b. Procedures for developing the learning resources

The main thing is to assure that the strategies for leading the course are clear and that the expectations for the facilitator are clear.

Prepare the Student

Objective Identify and prepare students to actively participate in the instruction and effectively interact with the newly developed learning resources.

You Should Already Know All of the learning resources have undergone formative revisions and the prerequisite knowledge and skills required of the student for the newly developed course have been identified.

Content The newly developed resources and the planned instructional strategies were revised during formative evaluation. Formative revisions were made with input from all of the stakeholder groups and are now ready for implementation. The knowledge and skills required to actively participate in the instruction have become increasingly clear. Now, there is a need to prepare the student to interact with the learning resources in the most efficient way and implement strategies that will stimulate ideas from the student that are not part of the existing learning resources, but also have the potential to close the performance gap.

The role of the student is to assume responsibility for her or his own learning. While the student may already possess some knowledge skills for the content area, each student needs to be prepared for meaningful interaction with the content of the

newly developed instruction and any peers who are concurrently engaged with the same learning resources.

Preparation of the student is a component of the Implementation Strategy. Preparing the student is a procedure within the Implement phase of ADDIE. One component of the *Prepare the Student* procedure is a Learner Plan.

The Learner Plan should focus on four parts:

1. Identification
2. Schedule
3. Pre-course Communication
4. Tracking

Identification

The purpose of this identification component is to confirm preferred student learning styles, student prerequisite knowledge and skills, recruitment strategies, and student retention plans. The student audience was carefully defined during the Analyze phase; however, it remains necessary to communicate the course details to the scheduler or person responsible for publishing course information.

Schedule

The schedule component should incorporate a method to ensure that individual students are identified for participation, and that each student will have satisfied the prerequisites prior to participating in the instruction. A schedule for student participation is developed indicating

a. Total number of students who will participate in the instruction
b. Number of students per class
c. Meeting venues
d. Class lists

(Although the designer initiates the Learner Plan, the scheduler or registrar may actually be responsible for generating and maintaining complete class lists and other pertinent student records.)

Pre-course Communication

When a student has been identified and scheduled for participation in a course of study, he or she should receive pre-course communication about the specifics of the course. Use the pre-course communication component of the Learner Plan as an

opportunity to encourage a positive attitude toward the impending instruction. The pre-course communication should include the following:

1. Logistical arrangements such as
    a. Location
    b. Date
    c. Travel
    d. Accommodations
    e. A description of the purpose of the instruction (in language that describes the benefit for the student)
    f. Anticipated outcomes
    g. Any required or recommended pre-work
2. Requests to bring something from the work site to the course for use during the course such as a
    a. Project
    b. Object
    c. Job sample
    d. Current problem

Tracking

Student records should be maintained according to institutional policy and organizational procedures. Tracking is a common term used for to describe the student records process; however, any term that communicates the concept of some type of learning management system is appropriate. While the designer is not likely the person responsible for maintaining student records, the designer should establish the requirements for maintaining student records. Some common types of records include

a. Examinations
b. Scores
c. Period for retaining student records
d. Schedule for contacting students for follow-up assessments

Practice Opportunity Carefully scrutinize the *Learner Plan* for the *Sample Case* in Fig. 4.1 and revise accordingly

Sample Case
Proposed Learner Plan

(The Learner Plan presented in this example is unacceptable. Review and Revise.)

Learner Identification	The student audience for this training is • Class size is 2–4 students each • Project Managers I, Project Managers II, and Senior Project Managers • Read "Leading Change" by Kotter • Complete Corpedia e Learning project Management Courses
Schedule	• Total number to be trained 150 • Training classroom A2 room 405 in Atlanta • Two-day training 8:00–5:00
Notification	• Prerequisites for class will be sent 3 days in advance • Five days prior to class participates will be sent e-mail reminder Upon completion of the course the students will be able to • Provide a clear definition of Change Management • Promote consistent use of terminology when discussing change principles • Create awareness of the Change Management process and tools • Realize that change mgt is often the most challenging aspect of a successful project • Integrate the critical components of Change Management into the current Project Manager process • Recognize to what degree Change Management is required • Assess the customer's willingness to accept change
Tracking	Each individual will be responsible to report back to her or his manager upon completion of the course Participates will be required to complete a Level I evaluation for the course and facilitator Corporate Training Services will: After 30-day period, coordinate a Level III evaluation with student's manager to assess the application of skills gained from training to the job

Fig. 4.1 This is a proposed Learner Plan for the Sample Case

Practice Opportunity Generate a *Learner Plan* (Fig. 4.2) for the *Firefighter Case* located in Appendix A.

Practice Case

(*Insert Title of the Course Here*)		
Component	**Activities and Directions**	**Comments**
Identification		
Schedule		
Notification		
Tracking		

Fig. 4.2 Template for a Learner Plan. Use this template to construct a Learner Plan for the Firefighter Case

Closure The *Learner Plan* is incorporated into the *Implementation Strategy*.

1. A comprehensive Learner Plan increases the potential for the planned instruction to satisfy the needs of the learner.
2. An effective implementation strategy facilitates closing the performance gap.

Result: An Implementation Strategy

The result of the Implement phase is an *Implementation Strategy*. Common components of the Implementation Strategy are as follows:

1. Prepare the Teacher
2. Prepare the Student

During the client meeting where the Implementation Strategy is delivered, usually one of two things happen: (A) the client requests changes to the implementation strategy or (B) the client is satisfied. If the client request changes, revise the implementation strategy accordingly and submit a revised Implementation Strategy. If the client is satisfied, then obtain the appropriate endorsements and proceed to the Evaluate phase.

	Analyze	Design	Develop	Implement	Evaluate
Concept	Identify the probable causes for a performance gap	Verify the desired performances and appropriate testing methods	Generate and validate the learning resources	Prepare the learning environment and engage the students	Assess the quality of the instructional products and processes, both before and after implementation
Common Procedures	1. Validate the performance gap 2. Determine instructional goals 3. Confirm the intended audience 4. Identify required resources 5. Determine potential delivery systems (including cost estimate) 6. Compose a project management plan	7. Conduct a task inventory 8. Compose performance objectives 9. Generate testing strategies 10. Calculate return on investment	11. Generate content 12. Select or develop supporting media 13. Develop guidance for the student 14. Develop guidance for the teacher 15. Conduct formative revisions 16. Conduct a Pilot Test	17. Prepare the teacher 18. Prepare the student	19. Determine evaluation criteria 20. Select evaluation tools 21. Conduct evaluations
	Analysis Summary	***Design Brief***	***Learning Resources***	***Implementation Strategy***	***Evaluation Plan***

Chapter 5
Evaluate

Contents

Abstract The purpose of the Evaluate phase is to assess the quality of the instructional products and processes, both before and after implementation. The common procedures associated with the Evaluate phase are associated with determining the evaluation criteria, selecting the proper evaluation tools, and conducting evaluations. Upon completion of the Evaluate phase, you should be able to identify your successes, recommend improvements for subsequent projects that are similar in scope, close any accounts related to this project, relinquish any ad hoc authority vested in you for this project, stop all work, transfer all responsibility for implementation and evaluation of the project to the designated administrator or manager, and adjourn the design and development team. The result of this phase is an Evaluation Plan. Common components of an evaluation plan are a summary outlining the purpose, data collection tools, timing, and person or group responsible for a particular level of evaluation, a set of summative evaluation criteria, and a set of evaluation tools. During the client meeting where the Evaluation Plan is delivered, the focus is on measurement. The guiding reference point for assessment and evaluation decisions is the performance gap.

Keywords Evaluate · Instructional design · Subject matter expert · Performance gap · Performance discrepancy · Return on investment · ROI · Purpose · Assessment · Plan

R.M. Branch, *Instructional Design: The ADDIE Approach*,
DOI 10.1007/978-0-387-09506-6_6, © Springer Science+Business Media, LLC 2009

Introduction to Evaluate

The purpose of the Evaluate phase is to assess the quality of the instructional products and processes, both before and after implementation. The common procedures associated with the evaluate phase are as follows:

19. Determine evaluation criteria
20. Select evaluation tools
21. Conduct evaluations

Upon completion of the Evaluate phase, you should be able to identify your successes, recommend improvements for subsequent projects that are similar in scope, close any accounts related to this project, relinquish any ad hoc authority vested in you for this project, stop all work, transfer all responsibility for implementation and evaluation of the project to the designated administrator or manager, and adjourn the design and development team. The result of this phase is an Evaluation Plan. Common components of an Evaluation Plan are as follows:

1. A summary outlining the purpose, data collection tools, timing and person or group responsible for the level of evaluation
2. A set of summative evaluation criteria
3. A set of evaluation tools

During the client meeting where the Evaluation Plan is delivered, the focus is on measurement. The guiding reference point for assessment and evaluation decisions is the performance gap. If the client is satisfied with the evaluation plan, then obtain the appropriate endorsements and stop all work on ADDIE. The remainder of this chapter is devoted to the common procedures of the Evaluate phase.

Determine Evaluation Criteria

Objective	Identify perception, learning, and performance as the three main levels of evaluation associated with instructional design.
You Should Already Know	1. The Analysis Summary has been closed and now archived. 2. The Design Brief has been closed and now used mainly as a reference to the goals and objectives. 3. The Learning Resources have been validated.
Content	The purpose of evaluation in the ADDIE approach to instructional design is to determine whether the quality of the learning resources satisfy the standards established in the Design phase. Such determination is based on the judgment criteria encumbered in the instructional goals and performance objectives.

Evaluation is a distinct discipline worthy of in-depth study about its theories and practice apart from other disciplines related to training and education. However, due to the prominent and essential role evaluation plays in instructional design, it is a feature of the ADDIE approach. Evaluation applied to ADDIE has been influenced by theorists such as Daniel Stufflebeam[1] and Michael Scriven.[2]

Evaluation initiates the ADDIE process, permeates the ADDIE process, and concludes the ADDIE process. Evaluation in instructional design focuses on measuring the student's ability to perform her or his newly constructed knowledge and skills in an authentic work environment. There are many reasons for conducting evaluations throughout the instructional design process such as determining accountability for training activities, garnering support for budget proposals, generating comparative data, determining the degree of success for training and education programs, providing baseline data for potential return on investment (ROI) formulas, and being a source of pride for a job well done.

Evaluation is used for assessing many types of learning solutions. The ADDIE approach to instructional design systematically assesses the varieties of learning solutions through different levels of evaluation. Leading evaluators such as Donald Kirkpatrick[3] and Jack Phillips[4] have influenced the practice of different levels of evaluation as applied to instructional design for decades. Kirkpatrick's (1998) book "*Evaluating Training Programs: The Four Levels*" refined his own evaluation model to essentially measure

1. *Reaction of student*: what they thought and felt about the training
2. *Learning*: the resulting increase in knowledge or capability
3. *Behavior*: extent of behavior and capability improvement and implementation/application
4. *Results*: the effects on the business or environment resulting from the trainee's performance

---

[1] Dr. Stufflebeam is Distinguished University Professor and Harold and Beulah McKee Professor of Education at Western Michigan University.

[2] Dr. Michael Scriven is a Distinguished Professor at the School of Behavioral and Organizational Sciences at Claremont Graduate University.

[3] Dr. Donald L. Kirkpatrick is Professor Emeritus of the University of Wisconsin.

[4] Dr. Jack Phillips is Chairman of the ROI Institute, Birmingham, Alabama.

Phillips' (1996) article "Measuring ROI: The Fifth Level of Evaluation" emphasized the need to calculate return on investment and sought to measure

1. *Reaction and Action Planning*: participant reactions and plans for using new knowledge and skills
2. *Learning*: change in participant's knowledge, skills, and attitudes
3. *Job Application*: participant's application of new knowledge and skills to the job site
4. *Business Results*: did the participant's application produce results on the job
5. *Return on Investment*: did the benefit of the results exceed the program costs

Each level of evaluation serves a different purpose, yet all levels are practiced in a cumulative effect. Level 1 should be administered prior to administering Level 2. Level 2 should be administered prior to administering Level 3, and so forth. Each level of evaluation is further distinguished by certain factors that characterize the way each evaluation level is administered referred herein as the "5 W's & H," who, what, when, where, why, and how.

Who will administer the evaluation? (Personnel)
What will specifically be measured? (Type of Data)
When will the evaluation be administered? (Timing)
Where will the evaluation occur? (Venue)
Why is this evaluation important? (Purpose)
How will the evaluation data be collected? (Tools)

The ADDIE approach to instructional design in this book promotes three levels of evaluation:

Level 1: Perception
Level 2: Learning
Level 3: Performance

Level 1 evaluation measures creature comforts that students tend to associate with a good course. Level 1 measures such things as the students' perceptions of the course content, resources used throughout the course, the comfort of the physical classroom environment, or the ease of navigation in a virtual classroom environment and the teacher's facilitation style. However, Level 1 does not measure whether learning has occurred. See the "5 W's & H" Level 1 evaluation below. Figure 5.1 is an example of a Level 1 evaluation tool.

Level 1: Perception

Who Administered by the Teacher

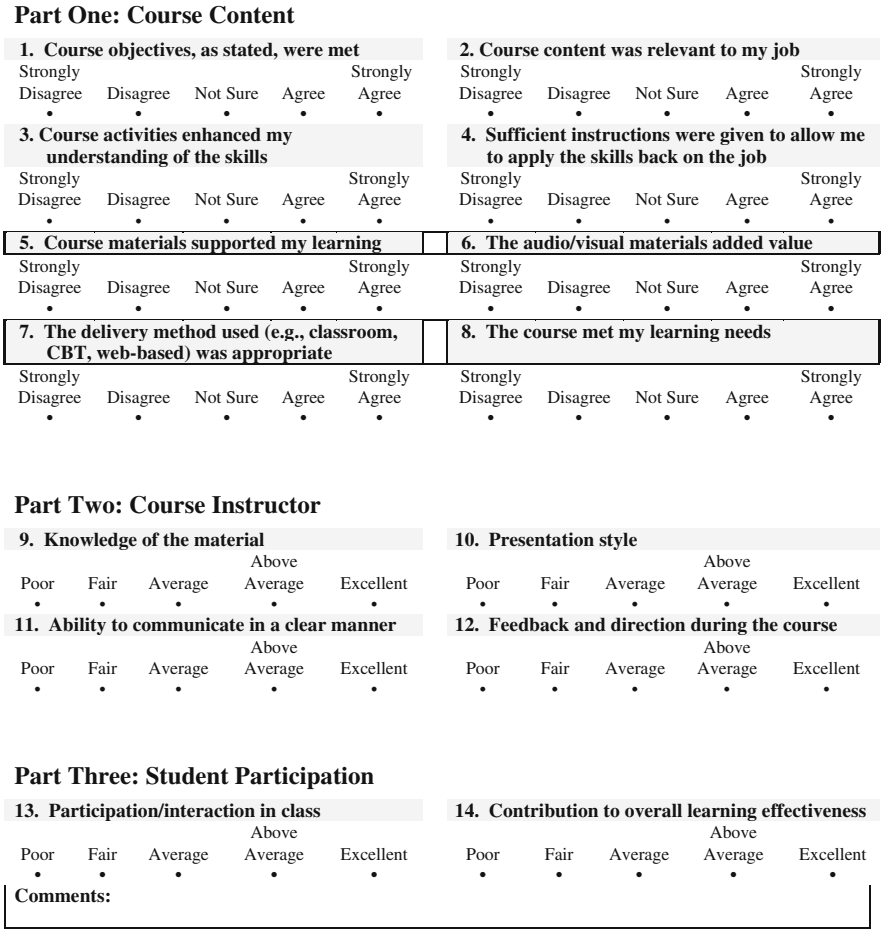
What Measure student perception

When Immediately at the conclusion of the course

Where Within the learning space (classroom)

Why
- Determine degree of satisfaction with the content
- Determine degree of satisfaction with the teacher

How
- Survey
- Questionnaire
- Interview
- Likert Scales
- Open-ended questions



Part One: Course Content

1. Course objectives, as stated, were met
Strongly Disagree • Disagree • Not Sure • Agree • Strongly Agree •

2. Course content was relevant to my job
Strongly Disagree • Disagree • Not Sure • Agree • Strongly Agree •

3. Course activities enhanced my understanding of the skills
Strongly Disagree • Disagree • Not Sure • Agree • Strongly Agree •

4. Sufficient instructions were given to allow me to apply the skills back on the job
Strongly Disagree • Disagree • Not Sure • Agree • Strongly Agree •

5. Course materials supported my learning
Strongly Disagree • Disagree • Not Sure • Agree • Strongly Agree •

6. The audio/visual materials added value
Strongly Disagree • Disagree • Not Sure • Agree • Strongly Agree •

7. The delivery method used (e.g., classroom, CBT, web-based) was appropriate
Strongly Disagree • Disagree • Not Sure • Agree • Strongly Agree •

8. The course met my learning needs
Strongly Disagree • Disagree • Not Sure • Agree • Strongly Agree •

Part Two: Course Instructor

9. Knowledge of the material
Poor • Fair • Average • Above Average • Excellent •

10. Presentation style
Poor • Fair • Average • Above Average • Excellent •

11. Ability to communicate in a clear manner
Poor • Fair • Average • Above Average • Excellent •

12. Feedback and direction during the course
Poor • Fair • Average • Above Average • Excellent •

Part Three: Student Participation

13. Participation/interaction in class
Poor • Fair • Average • Above Average • Excellent •

14. Contribution to overall learning effectiveness
Poor • Fair • Average • Above Average • Excellent •

Comments:

Fig. 5.1 Example of a Level 1 evaluation tool: *Perception*

Level 2 evaluation measures learning. Level 2 measures the student's ability to perform the tasks indicated in each of the goals and objectives. However, Level 2 evaluation does not guarantee whether knowledge and skills learned during instruction will actually be used on the job. See the "5 W's & H" Level 2 evaluation below. Figure 5.2 is an example of a Level 2 evaluation tool.

Level 2: Learning

Who Administered by the teacher or other designate

What Measure knowledge and skill acquisition

When Typically immediately upon completion of a course of study, however, could be any time during the period beginning with the completion of the course until a date prior to the application of the newly acquired knowledge and skills on the job

Where
- Learning space (classroom)
- Performance space (on the job)

Why
- Determine student potential to perform on the job
- Determine quality of the learning resources

How
- Examinations
- Role plays
- Observations
- Practice
- Simulations

Directions for completing scan sheet:
Use blue or black ink ballpoint pen or #2 pencil
Fill in the circle completely

Employee Number	Course Number	What is the primary reason you're attending this course?
① ① ① ① ① ①	① ① ① ① ①	• Necessary for my job
② ② ② ② ② ②	② ② ② ② ②	• Career advancement
③ ③ ③ ③ ③ ③	③ ③ ③ ③ ③	• Required
④ ④ ④ ④ ④ ④	④ ④ ④ ④ ④	• Personal interest
⑤ ⑤ ⑤ ⑤ ⑤ ⑤	⑤ ⑤ ⑤ ⑤ ⑤	• Told to be here
⑥ ⑥ ⑥ ⑥ ⑥ ⑥	⑥ ⑥ ⑥ ⑥ ⑥	
⑦ ⑦ ⑦ ⑦ ⑦ ⑦	⑦ ⑦ ⑦ ⑦ ⑦	
⑧ ⑧ ⑧ ⑧ ⑧ ⑧	⑧ ⑧ ⑧ ⑧ ⑧	
⑨ ⑨ ⑨ ⑨ ⑨ ⑨	⑨ ⑨ ⑨ ⑨ ⑨	
① ① ① ① ① ①	① ① ① ① ①	

Select the correct answer and fill in the corresponding letter/s in the column to the right.		**A**	**B**	**C**	**D**	**E**
1.	*Beginning of statement.....* A. *Choice A* B. *Choice B* C. *Choice C* D. *Choice D* E. *Choice E*	• • • • •				
2.	*Beginning of statement.....* A. *Choice A* B. *Choice B* C. *Choice C* D. *Choice D* E. *Choice E*	• • • • •				
n.	*Beginning of statement.....* A. *Choice A* B. *Choice B* C. *Choice C* D. *Choice D* E. *Choice E*	• • • • •				

Fig. 5.2 Example of a Level 2 evaluation tool: *Learning*

Level 3 evaluation measures job performance. Level 3 measures a student's knowledge and skill as they are actually applied in an authentic work environment. However, Level 3 evaluation does not provide a measure of impact on the organization's goals. See the "5 W's & H" Level 3 evaluation below. Figure 5.3 is an example of a Level 3 evaluation tool.

Level 3: Performance

Who Administered by a supervisor or a neutral third party

What Measure actual learning transfer

When A period beginning immediately after the student returns to the job until a date that represents a complete task cycle that required the need to perform the newly acquired knowledge and skill

Where Performance space (on the job) within a functional work unit

Why
- Determine student's ability to perform task with genuine consequences
- Judge whether the performance gap has been closed

How
- Authentic work tasks
- Performance checklists
- Supervisor assessments
- Peer reviews
- Observations

Action Plan

Name _____
Department _____
Contact Information _____

This is a summary of how I will apply my new knowledge and skills back on the job. I will accomplish the following goals within _____ days:

Goal WHAT I will do	**Activities** HOW I will do it	**Deliverable** WHAT will be the result	**Due** When

Supervisor _____
Contact Information _____

Fig. 5.3 Example of a Level 3 evaluation tool: *Performance*

Figure 5.4 presents the information related to the Who, What, When, Where, Why, and How for each of the three levels of evaluation for instructional design.

	Who	What	When	Where	Why	How
Level 1 Perception	Administered by the Teacher	Measure student perception	Immediately at the conclusion of the course	Within the learning space (classroom)	• Determine degree of satisfaction with the content • Determine degree of satisfaction with the teacher	• Survey • Questionnaire • Interview • Likert Scales • Open-ended questions
Level 2 Learning	Administered by the teacher or other designate	Measure knowledge and skill acquisition	Typically immediately upon completion of a course of study, however, could be any time during the period beginning with the completion of the course until a date prior to the application of the newly acquired knowledge and skills on the job	• Learning space (classroom) • Performance space (on the job)	• Determine student potential to perform on the job • Determine quality of the learning resources	• Examinations • Role plays • Observations • Practice • Simulations
Level 3 Performance	Administered by a supervisor or neutral third party	Measure actual learning transfer	A period beginning immediately after the student returns to the job until a date that represents a complete task cycle that required the need to perform the newly acquired knowledge and skill	• Performance Space (on the job) within a functional work unit	• Determine student's ability to perform task with genuine consequences • Judge whether the performance gap has been closed	• Authentic work tasks • Performance checklists • Supervisor assessments • Peer reviews • Observations

Fig. 5.4 Three levels of evaluation for the ADDIE approach to instructional design

Practice Opportunity Review the evaluation tasks on the Worksheet in Figure 5.5 and identify the appropriate evaluation level for each task. Present a rationale for your choice.

Evaluation Task	Level	Rationale
1. Decrease error rates on monthly reports by 20%		
2. Achieve a post-test score improvement of 25% over pre-test scores		
3. Decrease the amount of time required to process a customer transaction		
4. Rate the instructor's ability to teach on a 5-point scale		
5. Process customer complaints using the Dewey, Cheatum, and Howe procedure in at the Information Help Desk		
6. Achieve a work simulation test score average of 75		
7. Accomplish a satisfactory approval rating from your work supervisor after returning to the work site		
8. Recommend ways to improve the refreshments provided during the afternoon break		

Fig. 5.5 Worksheet for recommending the appropriate evaluation level and the proper rationale for the decision

Closure Judge the alignment of purpose, tools, and timing. Consider evaluating at multiple levels as resources allow.

Select Evaluation Tools

Objective Identify the primary attribute for each of the selected evaluation tools used in the ADDIE approach to instructional design.

You Should Already Know

1. All goals, objectives, content, instructional strategies, and testing methods are ready for implementation.
2. The criteria for each level of evaluation have been determined.

Content Evaluation is used at this stage of ADDIE rather than assessment, although both are often interchanged and regarded as synonyms. A complete treatise on the similarities and differences between evaluation and assessment is beyond the scope of this book. However, assessment is the term used throughout for describing a state of being without comparative data and avoiding value judgments. Whereas evaluation is used throughout to describe criterion-referenced measurements that have a high potential for influencing a decision-making process.

There are a variety of measurement tools that are available to instructional designers. Each measurement tool has its own attributes that render it effective for certain types of evaluation. A sample of evaluation tools include but are not limited to

- Survey
- Questionnaire
- Interview
- Likert Scale
- Open-ended questions
- Examinations
- Role plays
- Observations
- Practice
- Simulations
- Authentic work tasks
- Performance checklists
- Supervisor assessments
- Peer reviews
- Observations

Practice Opportunity Review the evaluation tasks on the Worksheet in Fig. 5.6 and identify an appropriate measurement tool. Present a rationale for your choice.

Evaluation Task	Tool	Rationale
1. Decrease error rates on monthly reports by 20%		
2. Achieve a post-test score improvement of 25% over pre-test scores		
3. Decrease the amount of time required to process a customer transaction		
4. Rate the instructor's ability to teach on a 5-point scale		
5. Process customer complaints using the Dewey, Cheatum, and Howe procedure in at the Information Help Desk		
6. Achieve a work simulation test score average of 75		
7. Accomplish a satisfactory approval rating from your work supervisor after returning to the work site		
8. Recommend ways to improve the refreshments provided during the afternoon break		

Fig. 5.6 Worksheet for selecting the appropriate evaluation tool and the proper rationale for your decision

Closure Use the appropriate evaluation tool to match the level of evaluation being undertaken.

Conduct Evaluations

Objective Provide guidelines for conducting evaluation in instructional design at all three levels.

You Should Already Know

1. The criteria for each level of evaluation have been determined.
2. The main evaluation tools have been identified.
3. The Implementation Strategy is complete.

Content Someone other than members of the core instructional design team typically does the actual administration of levels 1, 2, and 3 evaluations. However, the purpose for each level

of evaluation, the appropriate personnel who should be involved in the evaluation, and the procedures for each of the three levels of evaluation are prescribed in the Evaluation Plan. Therefore, conducting evaluations is beyond the scope of the instructional design team and becomes a set of tasks for the implementation team.

Practice Opportunity

Practice your knowledge about *Evaluation Planning* by generating an Evaluation Plan using the template in Fig. 5.7 and using the content from the Firefighter Case in Appendix A.

Practice Case

	Who	What	When	Where	Why	How
Level 1 Perception						
Level 2 Learning						
Level 3 Performance						

Fig. 5.7 Template for generating an Evaluation Plan

Closure

Evaluation is an ongoing process. Evaluation aids the instructional design team in judging the quality of the learning resources as well as judging the quality of the process that was used to generate those learning resources. Multiple levels of evaluation should be used at the conclusion of the instructional design process.

Result: An Evaluation Plan

The result of the Evaluate phase is an ***Evaluation Plan***. The primary artifact of the Evaluation Plan is a summary chart indicating the "5 W's & H" for each of the three levels of evaluation. It is also customary for the instructional design team to generate at least one measurement tool for each of the three levels of evaluation as part of the Evaluation Plan (although someone other than a member of the core instructional design team will be responsible for administering the evaluations after the design project is complete and the course of study has been implemented).

During the client meeting where the Evaluation Plan is delivered, usually one of two things happen: (A) the client requests changes to the evaluation plan or (B) the client is satisfied. If the client request changes, revise the Evaluation Plan accordingly and submit a revised Evaluation Plan. If the client is satisfied, then obtain the appropriate endorsements and stop all ADDIE work.[5]

[5] *A Final Report may be required as may have been negotiated earlier in the Analyze phase*

Epilogue

Abstract The strength of ADDIE is its ability to be both descriptive and prescriptive. Descriptive because it shows relationships, illustrates what happens during a process, it's interactive, it explains, provides if–then relationships, and the ADDIE approach can be adapted to practically any development context. Prescriptive because it guides, assigns methods and procedures, generates strategies, is goal oriented, active, and a variety of models can be applied to the ADDIE paradigm. Instructional designers should also consider specific contextual issues that may require the application of additional considerations such as rapid prototyping and concurrent engineering. Successful instructional design practice requires competent professionals with knowledge, skills, and experience about managing multiple complex procedures within defined periods of time. Probably the single most factor that is constant in instructional design is that it is a process devoted almost exclusively to seeking ways to close a performance gap that is caused by a lack of knowledge and skills. However, there is a need for alternative paradigms that has emerged from the advent of new learning theories as well as new instructional theories, the need to respond to rapidly evolving learning environments, flexible educational delivery systems, the growth of distance learning and technological innovations. The growing attention to accountability in training and education and a rising emphasis on return on investment also require a nimble and agile instructional design process, regardless of the supporting framework. ADDIE is an approach to instructional design with a proven record of success.

Keywords ADDIE · Instructional design · Performance gap · Concurrent · Engineering · Rapid prototyping · Online learning · Learning environments · Descriptive · Prescriptive

ADDIE (Fig. 1) provides a place for instructional design to begin, offers boundaries, and features rules for practice when properly practiced. The strength of ADDIE is its ability to be both descriptive and prescriptive. ADDIE is descriptive because it shows relationships, illustrates what happens during a process, it's interactive, it explains, provides if–then relationships, and

R.M. Branch, *Instructional Design: The ADDIE Approach*,
DOI 10.1007/978-0-387-09506-6_7,

	Analyze	Design	Develop	Implement	Evaluate
Concept	Identify the probable causes for a performance gap	Verify the desired performances and appropriate testing methods	Generate and validate the learning resources	Prepare the learning environment and engage the students	Assess the quality of the instructional products and processes, both before and after implementation
Common Procedures	1. Validate the performance gap 2. Determine instructional goals 3. Confirm the intended audience 4. Identify required resources 5. Determine potential delivery systems (including cost estimate) 6. Compose a project management plan	7. Conduct a task inventory 8. Compose performance objectives 9. Generate testing strategies 10. Calculate return on investment	11. Generate content 12. Select or develop supporting media 13. Develop guidance for the student 14. Develop guidance for the teacher 15. Conduct formative revisions 16. Conduct a Pilot Test	17. Prepare the teacher 18. Prepare the student	19. Determine evaluation criteria 20. Select evaluation tools 21. Conduct evaluations
	Analysis Summary	*Design Brief*	*Learning Resources*	*Implementation Strategy*	*Evaluation Plan*

Fig. 1 A conceptual framework for organizing intentional learning

the ADDIE approach can be adapted to practically any development context. ADDIE is also prescriptive because it guides, assigns methods and procedures, generates strategies, is goal oriented, active, and a variety of models can be applied to the ADDIE paradigm.

Because instructional design is practiced in a variety of settings, there are many different models devoted to the instructional design process. The designer creates procedural models to match unique situational characteristics of a given organization. Instructional designers increase their potential for success when the applied model matches the educational context. However, instructional designers should also consider specific contextual issues that may require the application of additional considerations such as rapid prototyping and concurrent engineering.

Rapid prototyping as an approach to instructional design increases opportunities to clarify needs, enhance creativity, reduce errors in final product, increase usability, and increase customer acceptance where applicable. However, some of the risks associated with rapid prototyping include employing methods that are often misunderstood by clients and sometimes even media developers, getting caught in a loop of endless revisions, premature release of the learning resources, goal creep, unrealistic expectations of subject matter experts, and other strategic stakeholders and project management requirements that can be unfamiliar to those uninitiated into the rapid prototyping approach.

Concurrent engineering, as the name implies, promotes an approach whereby most of the instructional design procedures occur during the same time. A concurrent engineering approach avoids problems often caused during

the transition from one instructional design phase to another, tends to enhance creativity by including representatives from all stakeholder groups from the very beginning of the project through to the end of the project, reduces incompatibilities between the learning resources that are developed during the instructional design process and the resources that are actually implemented at the conclusion of the design process, the potential for increased usability and increased customer acceptance, where applicable. However, some of the risks associated with concurrent engineering include employing methods that are often misunderstood by clients and sometimes even media developers, getting caught in a loop of endless revisions, premature release of the learning resources, goal creep, unrealistic expectations of subject matter experts and other strategic stakeholders, and project management requirements that can be unfamiliar to those uninitiated into the rapid prototyping approach.

Therefore, successful instructional design practice requires competent professionals with knowledge, skills, and experience about managing multiple complex procedures within defined periods of time. People who intend to use an ADDIE approach to instructional design should acquire instructional designer competencies such as those promoted by the International Board of Standards for Training, Performance and Instruction.

Probably the single most factor that is constant in instructional design is that it is a process devoted almost exclusively to seeking ways to close a performance gap (Fig. 2) that is caused by a lack of knowledge and skills. Still, there is a need to explore alternative paradigms for instructional design. The need for alternative paradigms emerges from the advent of new learning theories as well as new instructional theories. The notion of student-centered designs remains more rhetoric than substance among the broad educational community, and thus, worthy of continued attention by instructional technologists and educational practitioners alike. The need to respond to rapidly evolving learning environments, flexible educational delivery systems, the growth of distance learning, and technological innovations will require adaptations of ADDIE

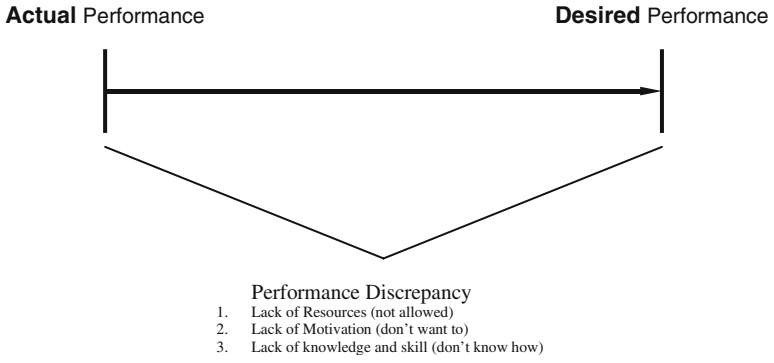


Fig. 2 Fundamental concept of performance gap

or completely new instructional design paradigms. Certainly, the growing attention to accountability in training and education, and a rising emphasis on return on investment will demand a nimble and agile instructional design process, regardless of the supporting framework.

Finally, Analyze, Design, Develop, Implement, and Evaluate (ADDIE) describe a conceptual paradigm applied to instructional design in order to generate episodes of intentional learning. Individuals exist in a perpetual state of tentional learning where the need to arrange experiences is often unnecessary, and thus, you don't need ADDIE to generate instructional interventions. However, there are times when individuals can benefit greatly from planned intentional activities in order to match some agreed-upon defined expectation. While there are many valid ways to plan instructional interventions, ADDIE is an approach to instructional design with a proven record of success.

Appendix A
Firefighters for the Digital Age: A Practice Case

Introduction

The purpose of this case is to provide an opportunity for students of instructional design to practice different procedures associated with ADDIE while constructing a solution for a performance problem. Solutions not provided and additional details, such as dilemmas and problems encountered by one or more characters as a result of the decisions made by other characters in this case, should be generated by the individual or team in this case. Each student is expected to provide data and information for a client, who will then render a decision. Students are directed to use these data as a starting point, generate additional information as needed to close the parts of the performance gap that are attributable to a lack of knowledge and skills.

This case is intended for situations likely encountered within an organization, such as a higher education system, a government agency, and an international business. Multiple stakeholders are often affected by the solutions that are eventually adopted by the organization. This case provides an opportunity for participants to practice the five ADDIE phases of instructional design as they relate to issues of gender, age, physical ability, technical aptitude, and cultural diversity. These hypothetical data are based on present-day emergency response situations.

Context

Universal Carrier is a worldwide transportation business that employs 102,000 people in 71 countries throughout in Africa, Asia, the Caribbean, North, Central and South America, Europe, and the Middle East. Universal Carrier was founded as Harlem Movers and Shakers in 1957 in the Bronx, New York,

This is a hypothetical case about a fictitious situation. Any resemblance to a real person or real organization is coincidence. All information is negotiable, and subject to change, however, all changes must be realistic, empirically supported, and believable.

R.M. Branch, *Instructional Design: The ADDIE Approach*,
DOI 10.1007/978-0-387-09506-6, © Springer Science+Business Media, LLC 2009

as an independently owned and operated nationwide moving company. Harlem Movers and Shakers acquired the Kalahari Courier Service, located in Compton, California, in 1959, and heralded by the *Amsterdam Times* newspaper as "having revolutionized the people moving business." Five years later, Harlem Movers and Shakers merged with the London-based Trans Continental Air Lines and changed its name to Universal Carrier. Universal Carrier grew to 93,500 employees, added a fleet of seagoing vessels to its air and ground vehicles, and was incorporated in 1968. During the 30-year period between 1969 and 1999, Universal Carrier slumped and rebounded along with the United States economy, and initiated a stock split, but remained a growth company, and moved its headquarters to Atlanta, Georgia. The International Quality Sigma Association recognized Universal Carrier with its Exemplary Award in the Transportation category in 1996. The American Society for Performance and Development named Universal Carrier as having the best Learning Services Organization for the year 2000. While Universal Carrier has experienced uneven profits during the past 5 years, the company remains remarkably healthy overall. Market analysts attribute Universal Carrier's continued success in today's global economy to leadership that implemented a strategy that shifted the business emphasis from the weaker segments to stronger segments consistent with demand, the purchase of a communications company as a wholly owned subsidiary, the replacement of practically all of the company's equipment worldwide to digital technologies, and a focus on performance at every position throughout the entire company.

The unique quality that made Harlem Movers and Shakers so successful in the early years of its operation was the complete service package offered by the company to clients which included making all of the travel arrangements for a family that was relocating from one place to another, including the arrangement of essential services at the new location prior to arrival of the client. Universal Carrier has grown into an enterprise that requires the infrastructure of a small town for each of their physical locations around the world. Thus, Universal Carrier has instituted its own fire and rescue teams for its worldwide operations.

While this total quality service philosophy continues until today, there is one area of today's Universal Carrier business that has experienced a decline in quality over the past 24 months. The response capability of Universal Carrier's fire and emergency rescue units is approaching unacceptable performance levels, and therefore threatens the very foundation of the company's existence.

The Director of the Emergency Response and Rescue Unit has been informed by the Vice President of Security to enhance the capacity of its firefighter and rescue teams. The Director of Emergency and Rescue Unit contacted Human Resources. The Director of Human Resources has consulted with the Chief Learning Officer and proposed a *Firefighters for the Digital Age* training project as a company-wide priority for the next two fiscal years. The Director of the Fire Management Department has been assigned as the project manager. The Fire Management Department is responsible for the prevention

of hazardous situations, emergency response, and rescue equipment maintenance. The department's newly designated areas of responsibility require different job tasks for newly hired firefighters and current firefighters as well.

Character	Role	Background
Vice President for Security		
Director of Emergency Management		
Director of Human Resources		
Chief Learning Officer		
Manager of Technical Operations		US Air Force–Retired
Project Manager		
Lead Instructional Designer		
Senior Instructional Designer		
Instructional Designer		
Media Development Specialist		

Fig. A.1 Primary characters, their roles, and their backgrounds

Preliminary interview results indicate a lack of knowledge in basic facts of what and how firefighters conduct themselves during an emergency situation. This lack of knowledge is due to the over romanticizing of the job, as well as Hollywood's portrayal of the duties of firefighters. These duties and abilities are the primary focus of the training. The typical candidate indicated little or no actual knowledge or experience in the field of firefighting. Figure A.1 is a summary of the primary characters, their roles, and their backgrounds. Figure A.2 contains a list of resources that will be made available by the client at the time of the request for training.

Human	*Content*	*Administrative*	*Technology*
• Thomas Tomjonavich, Program Manager Training and Development (770) 502–5432 • Steve Brown, Manager Customer Programs (404) 294–1237 • Keisha Hall, Instructor Learning Services (706) 255–0198 • Rre Hernandez Senior Firefighter (212) 227–3810	• The International Fire Safety and Rescue Federation is the primary source of knowledge, rules, regulations and procedures for the orientation and subsequent firefighting courses • All existing training manuals • Details from partner companies and subsidiaries	• Senior Executive Assistant, Department of Fire Management Sharon Blazer (770) 502–5432 • Video and Technical Services • Overnight accommodations with room and board • Special offices have been made available at company headquarters for the duration of the design and development of the project	• State-of-the-art educational media and technology are available • Classrooms, simulators, mock-ups and actual working equipment • Five acre [off-site] training facility with life size buildings representing various architectures • Construction materials for erecting small frame buildings

Fig. A.2 A list of the initial resources that will be made available by the client at the time of the request for training

• **Fire and Rescue Advisory Board** *(See local Office Directory)* Janice Scott Paul Hogan Bill Katz Bennett Johnson Jen Baker Ora Panabianco Richard Garfein Mike Winthrope			• Classrooms and laboratories with Internet access

Fig. A.2 (continued)

Primary Characters *(This section should be completed by your design team)*

The chief learning officer of Universal Carrier has confirmed the following project outline.

Time Span: Four Months

Request for training received on September 4, 2007
Pilot course planned to start on January 4, 2008
Six-week course
New course cycle implemented on March 1, 2008
Course cycle last for 3 years
Course to be offered 5–10 times during the year

Case Events

Since 2001, the average number of women applicants has increased from 2 to 18%, physical requirements have been reduced due to more operations that increasingly involve data and knowledge management, the number of employees eligible for retirement has peaked to 37%, and there has been a paradigm shift to a "more educated" firefighter. Some of the positive aspects of

Universal Carrier's infrastructure since 2001 have included a completely new satellite-based worldwide communications system, and practically all new surveillance equipment, especially computers and other digital technologies.

Last year, the independent accounting firm of good, fast, and cheap found absolutely no fiscal improprieties during its audit, and Wall Street Industries gave Universal Carrier its highest financial rating. However, Universal Carrier is in jeopardy of losing its security and safety accreditation, which means the loss of eligibility for United States government funding, the loss of World Bank funding, and other downgrades that will adversely affect the business.

The lead designer has been given the following charge and is ready to start the project: "The purpose of the course is to prepare candidates to demonstrate their ability to appropriately respond to fire emergency situations." The applicants have satisfied a preliminary written examination administered via a computer terminal at a regional emergency and rescue operations center. The original plan is for the participants who successfully complete the orientation to be hired for a 1-year probationary period with progress evaluations at 3-month intervals during the first year. Each candidate who successfully completes the *Firefighters for the Digital Age* course will undergo subsequent extensive firefighting and emergency response training in both general and specific duty areas. The preliminary expectations given to the design team are that employees who successfully complete the course should be able to

1. Perform appropriate fire management duties
2. Use firefighting equipment
3. Define different types of fire and rescue emergencies
4. Select appropriate protection garments and devices
5. Be youthful and energetic
6. Identify various architectures
7. Calculate fundamental computations
8. Interpret standard operating procedures
9. Analyze safety risks
10. Estimate emergency medical needs
11. Synthesize action plans
12. Evaluate potential fire and emergency hazards
13. Leap tall buildings in a single bound . . . well, maybe not ☺

Appendix B
Self-Test of Instructional Design Knowledge

Choose the Best Answer for Each Item

1. What are the five components of ADDIE?

   A. Assess, design, determine, implement, enact
   B. Analyze, design, develop, implement, evaluate
   C. Analyze, determine, design, implement, enact
   D. Assess, develop, determine, instruct, evaluate

2. Student-centered spaces dedicated to training, education, and other forms of intentional learning

   A. Can be situated at remote sites, accessed at convenient times, and personalized to match the capacity of individual learners
   B. Are synchronized in order to maximize the efficiency of the learning process
   C. Occur in primarily a constant location
   D. Are patterned after models that seek replicate our desire to compartmentalize didactic and de-contextualized rote learning consistent with the industrial age

3. The primary reason for conducting a performance assessment or performance analysis is to

   A. Assess the quality of the available instructional products
   B. Gather and validate the instructional materials
   C. Identify probable causes for a performance discrepancy
   D. Determine what computer-based training should be implemented

4. When working with subject matter experts, it is best to

   A. Follow the direction of subject matter experts regardless of its plausibility
   B. Interact with subject matter experts as little as possible to reduce costs
   C. Work with subject matter experts only through the client
   D. Prepare an agenda prior to meeting with subject matter experts

5. Analysis is used in instructional design to determine

   A. How to organize the terminal tasks for a given set of learners
   B. If training is the best response to a performance discrepancy
   C. The effectiveness of instructional materials
   D. Which research methodology should be used to verify the outcomes

6. Instructional designers should apply development models that are

   A. Dependent on the context of the project and available resources
   B. Solely based on the designer's philosophy and preferences
   C. Exclusively linear and mostly procedural
   D. Best suited for low-level cognitive tasks

7. Terminal tasks in instructional design are

   A. Constructed by the student unrelated to the judgment criteria
   B. Tasks the student should be able to perform at the conclusion of an entire course
   C. Self-directed learning objectives without input from the teacher
   D. The same as prerequisite tasks

8. Instructional design is a set of procedures intended to respond to situations where there is a lack of

   A. Knowledge and skills
   B. Motivation
   C. Resources
   D. All of the above

9. Criterion-referenced objectives describe what the students should be able to perform

   A. Prior to an episode of guided learning
   B. During a future episode of guided learning
   C. As a result of an episode of guided learning
   D. On a norm-referenced, standardized test

10. A student's prerequisite knowledge and skills should be confirmed

    A. During a future episode of guided learning
    B. As a result of an episode of guided learning
    C. On a norm-referenced, standardized test
    D. Prior to an episode of guided learning

11. The correct order of Bloom's taxonomy is

    A. Knowledge, application, synthesis, comprehension, evaluation, analysis
    B. Knowledge, comprehension, application, analysis, synthesis, evaluation
    C. Comprehension, knowledge, application, analysis, synthesis, evaluation
    D. Knowledge, comprehension, analysis, application, synthesis, evaluation

12. The performance component of a criterion-referenced objective is best described as

    A. A preposition
    B. A noun
    C. An adjective
    D. A verb

13. While working with a client, it is important to

    A. Ask vague questions during interactions
    B. Comply with their wishes regardless of other factors
    C. Document all communication and interactions
    D. Obtain sign-off only during the design phase

14. What are the two most common categories of evaluation used in instructional design?

    A. Declarative and expository
    B. Formative and declarative
    C. Formative and summative
    D. Summative and declarative

15. Which of the following precept about instructional design is *false*?

    A. Instructional design is only relevant for highly defined low-level cognitive tasks
    B. Instructional design is student centered
    C. Criterion-referenced objectives are expressed in performance terms
    D. Instructional outcomes are measured in a reliable and valid way

16. Instructional design is a responsive process because

    A. Instructional design is only relevant for highly defined low-level cognitive tasks
    B. It accepts whatever goals are established as its orientation
    C. Criterion-referenced objectives are expressed in performance terms
    D. Instructional outcomes are measured in a reliable and valid way

17. Which of the following is the main function of media within instructional design?

    A. Enhance the quality of the instructional strategies
    B. Facilitate the performance objectives
    C. Meet the needs of different learning styles
    D. All of the above

18. The purpose of the design phase of ADDIE is to

    A. Conduct the training sessions
    B. Verify the desired performances, the learning tasks, and the appropriate testing strategies
    C. Enhance the performance of the instructors
    D. Select the computers needed for the course

19. Instructional design is usually most effective when practiced by

    A. Individuals working independently toward different goals
    B. Adopting a simple linear procedural model
    C. Computer sub-routines embedded within instructional technology
    D. Cross-functional teams with diverse expertise collaborating to achieve the same goals

20. A performance discrepancy is caused by

    A. The difference between the actual performance and the desired performance
    B. The actual performance being equal to the desired performance
    C. The desired performance being equal to the actual performance
    D. Lack of sufficient computing technology

21. Instructional design is intended to be

    A. Responsive only
    B. Generative only
    C. Responsive and generative
    D. Neither responsive nor generative

22. The purpose of the implement phase of ADDIE is to

    A. Filter out participants who are unsuited for the program
    B. Pre-assess the student's capabilities
    C. Prepare the learning environment and engage the students
    D. Determine if there is a performance discrepancy

23. Learning that is domain specific or executive in nature, as in meta-cognitive, describe

    A. Intellectual skills
    B. Attitudes
    C. Learning resources
    D. Motor skills

24. Which of the following procedures is typically conducted in the develop phase of ADDIE?

    A. Select or develop supporting media
    B. Conduct Level 6 evaluations
    C. Learner analysis
    D. Project management plan

25. The purpose of the evaluate phase of ADDIE is to

    A. Assess the quality of the instructional products and processes, both before and after implementation
    B. Conduct Level 6 evaluations
    C. Calculate return on investment (ROI)
    D. Assign student grades

26. Three essential components of a performance objective are

    A. Performance, comprehension, and criteria
    B. Performance, condition, and criteria
    C. Technology, condition, and knowledge
    D. Performance, skills, and technology

27. The ADDIE procedure of validating instructional strategies and learning resources during the develop phase is called

    A. Content analysis
    B. Needs assessment
    C. Summative evaluation
    D. Formative evaluation

28. Performance objectives are valuable because they inform the student about what

    A. Knowledge and skills they should bring to the class
    B. Level of evaluation the teacher will use to validate their learning
    C. Technology resources they will learn in class
    D. They are expected to learn

29. **Conditions -> Methods -> Results** describe

    A. Computer-based education
    B. Computer-based instruction
    C. Educational media and technology
    D. An input process–output model

30. Instructional design is a process used to

    A. Generate curricula, courses, teaching units, and single episodes of guided learning
    B. Resolve personal conflicts in the workplace
    C. Respond to performance discrepancies that are caused by a lack of resources
    D. Respond to performance discrepancies that are caused by a lack of motivation

31. The component of a performance objective that describes the important circumstances under which the performance is expected to occur is the

    A. Condition
    B. Test item
    C. Performance
    D. Criteria

32. The component of a performance objective that describes the quality or standard of performance that will be considered acceptable is the

    A. Condition
    B. Test item
    C. Performance
    D. Criteria

33. The type of test that compares the performance of a student with the degree to which the objectives were achieved describe a

    A. Recall test
    B. Criterion-referenced test
    C. Non-recall test
    D. Norm-referenced test

34. The type of test that compares the performance of a student with the performance of other students describes a

    A. Recall test
    B. Criterion-referenced test
    C. Non-recall test
    D. Norm-referenced test

35. ADDIE is

    A. A short form for describing the nature of the work done by subject matter experts
    B. The name of the daughter of the person who invented the process
    C. A paradigm used by subject matter experts when composing their final report
    D. An acronym for a common product development process that can be effectively applied to instructional design

Answer Key

1. B
2. A
3. C
4. D
5. B
6. A
7. B
8. A
9. C
10. D
11. D
12. D
13. C
14. C
15. A
16. B
17. D
18. B

19. D
20. A
21. C
22. C
23. A
24. A
25. A
26. B
27. D
28. D
29. D
30. A
31. A
32. D
33. B
34. D
35. D

Glossary

Action Learning*:* A performance-oriented, student-centered, problem-based strategy that promotes immediate and long-term knowledge and skill transfer. Action learning is effective because of the fidelity sought between classroom-based activities (learning space) and requirements outside the classroom (performance space).

ADDIE: A product development paradigm. The components include analyze, design, develop, implement, and evaluate.

Affective Domain: The division of Bloom's taxonomy of educational objectives that references those objectives and test items demonstrating interest, appreciation, attitudes, values, and psychological adjustment.

Analysis Summary: The document completed at the conclusion of the analyze phase that records your research and describe your findings, conclusions, and recommendations. Components include a statement describing the cause of the performance discrepancy and the potential value added for training, a purpose statement for the training project, a list of the instructional goals, a learner audience profile, a list of resources you will require, and recommended training delivery system options including cost estimates for each option.

Analyze: The first phase of the ADDIE instructional systems design process; its purpose is to identify the probable causes for the absence of performance and recommend a solution.

Asynchronous: Any place and any time.

Attitude: Personal choice and human modeling are manifestations of attitudes.

Behavior: An action that is an overt, observable, measurable performance.

Bloom's Taxonomy: A classification of behavior and learning developed by Benjamin Bloom and several colleagues; organized into three different domains of learning: cognitive (or intellectual), affective (or emotional/attitudinal), and psychomotor (or physical, motor).

Classroom Model: One type of models in which ISD is commonly applied. The model assumes that the context includes a few hours of classroom instruction as seen in schools where the instructor is often the developer of the instruction. Classroom models usually outline only a few ISD functions and offer instructors a general road map to follow.

Classroom Training: Any instructional or training technique, which utilizes classroom environment.

Criteria: Criteria is the third component of a learning objective that describes the quality or standard of performance that will be considered acceptable.

Criterion-Referenced Test: Criterion-referenced test is the type of test that compares the performance of a student with the degree to which the objectives were achieved.

Criterion-Referenced Test Items: Test items whose responses are compared with some objective standard rather than with other responses as in norm-referenced items.

Coach: The coach's overall role is to help the team accomplish their given tasks by answering questions and offering advice and guidance on how to approach a given situation using the methodology adopted by a community of practice.

Computer-Based Training (CBT): Any instructional or training technique, which features a computer.

Cognitive Strategies: Learning that is domain specific or executive, as in meta-cognitive, describes cognitive strategies.

Condition: Condition is the component of a learning objective that describes the specific situation in which the performance occurs.

Content Analysis: Content analysis is a procedure that, when applied to an instructional goal, results in the identification of the relevant knowledge, skills, and procedures required for a learner to achieve the goal.

Content Resources: Content resources include existing course material, existing videos. These pre-existing resources may be available that contain valuable content. They could be used in one of the following ways, such as reference for content, as reference for learning strategies, parts used in the training without alteration, parts used for illustration or examples only.

Concurrent Engineering: An ISD approach first used in industrial engineering that refers to direct involvement of all stakeholders in all stages of the process.

Debriefing: Debriefing is the process of helping people reflect on their experiences to develop meaningful learning. The purpose of a debriefing session is to gather oral feedback from test participants. A designer or an evaluation professional will write the debriefing question. During the debriefing session, make sure that all comments are captured and that discussions stay focused and relevant.

Deliverables: Any measurable, tangible, verifiable output that must be produced to complete the project or a training course.

Delivery System: Term used to describe the means by which instruction will be provided to learners. Includes instructor-led instruction, distance education, computer-based instruction, web-based instruction, and self-instructional materials.

Design: The second phase of the ADDIE instructional systems design process; its purpose is to verify the learning tasks, performance objectives, and testing strategies.

Design Brief: The document completed at the conclusion of the design phase showing a detailed overview of the training. Components included are a sequenced list of learning tasks; a sequenced list of performance objectives; a list of testing strategies, a summary of benefits derived from the training.

Develop: The third phase of the ADDIE instructional systems design process; its purpose is to generate and validate the training materials.

Embedded Tests: Opportunities for student to demonstrate their knowledge and skills in meeting objectives during the episodes of intentional learning.

Evaluate: The fifth phase of the ADDIE instructional systems design process; its purpose is to assess the quality of the training materials prior to and after implementation and the instructional design procedures used to generate the instructional products.

Evaluation Plan: The deliverable for the evaluation phase of ADDIE.

Facilitator Guide: The print resource that is used by the facilitator to lead the instruction. Incorporates all aspects of analysis and design into its development, making it the primary vehicle to house all facets of the instruction: instructional strategies, testing strategies, learning objectives, content, pacing, timing, introductions, closure, transitions, and reviews.

Facilitator Plan: The portion of the implementation plan that describes how the facilitators will be selected and prepared to lead the training event includes the following components: identification, schedule, preparation (train-the-trainer).

Feedback: Information received that is either confirming or corrective of some action.

Field Trial: The final stage in formative evaluation, referring to the evaluation of the program or product in the setting in which it is intended to be used.

Flowcharting: Procedure for identifying and graphically representing the sequential and alternative relationships among processes and decision points relevant to completing a project.

Formative Evaluation: The process of collecting data that can be used to *revise* the instruction *before implementation*, thus making the instruction more effective. A pilot test is an example of formative evaluation.

Gagne's Nine Events of Instruction: A method for organizing instructional strategies within the lesson designed by Professor of Instructional Design, R.M. Gagne. The nine events of instruction include gain attention, inform learners of the objectives, stimulate recall of prior learning, present the stimulus (content), provide learner guidance, elicit performance, provide feedback, assess performance, enhance retention and transfer (closure).

Group-Based Instruction: The use of learning activities and materials designed to be used in a collective fashion with a group of learners; interactive, group-paced instruction.

Hierarchical Analysis: A technique used with goals in the intellectual skills domain to identify the critical subordinate skills needed to achieve the goal and their interrelationships. For each subordinate skill in the analysis, this involves asking, "What must the student know how to do in order to learn the specific sub-skills being considered?"

Human Resources: Human resources include facilitators, coaches, manager contact, and subject matter experts.

ID Model: A graphic representation of a systematic approach. Designed to facilitate efficient and effective development of instruction.

Implement: The fourth phase of the ADDIE instructional systems design process; its purpose is to conduct the training.

Implementation Plan: The deliverable for the implement phase consisting of the learner plan which is used to identify and prepare the learners to participate in the instruction and the facilitator plan which is used to identify and prepare the teachers to facilitate the instruction.

Instruction: Instruction is the delivery of information and activities that facilitate learner's attainment of intended learning goals.

Instructional Goals: Brief statements describing the terminal tasks those learners will perform as a result of the training. Note that they describe performance and *do not* specify the criterion (standards) for neither the performance nor conditions under which the performance will be demonstrated.

Instructional Design: Instructional design refers to the systematic process of translating principles of teaching and learning into plans for learning resources and instructional strategies.

Instructional Designer (Instructional Developer or ID): This is the person who performs consulting and development tasks necessary to create learning resources. This person (or team) typically gathers and analyzes information

about content and skills. Determines performance objectives based on the results of information gathered. Writes the Blueprint and draft materials. Works with media people to assure that all-master materials adhere to the design of the course. Organizes the test session and rehearses the instructor. Prepares the materials for the reviews required at each stage of the instructional development process. Makes revisions specified by the project manager or sponsor.

Instructional Facilities: Instructional facilities include number of rooms, room capacity, and times available.

Instructional Strategies: The means by which the content and skills are transferred from the training delivery vehicle (instructor or CBT or video or Web) to the learner. Examples include demonstrations, role plays, hands-on practice, simulations, discussion, lecture, illustrated diagrams with explanations, step-by-step review; self-study exercises, reviews, on-the-job training exercises, practice with coaching, video demonstrations, examples or role plays, and others. Often organized by these categories: pre-instructional activities, content presentations, learner practice, feedback, and closure.

Instructional Systems Design: (Also known as instructional design) The name given to the process of creating instruction in order to close a performance gap that is due to a lack of knowledge and skills.

Iterative Process: One that is nonlinear; offers the opportunity to return to parts of the process and make changes due to knowledge gained in other parts of the process.

Intellectual Skills: A skill that requires some unique cognitive activity; involves manipulating cognitive symbols, as opposed to simply retrieving previously learned information.

Jargon: Special terms generated, adopted, or adapted by members or a profession that enables a shorthand communication that is efficient for practitioners who understand the terms but may be confusing to those unfamiliar with the jargon.

Job Aid: A teaching device intended to be self-explanatory and self-instructional; a formalized set of textual and graphical step-by-step directions for accomplishing a task through one or more techniques.

Knowledge: A thought, fact, or concept such as a cognitive task.

Learner Analysis: Data collected about the student group(s) used to inform decisions throughout the ADDIE. Components include learner group(s) identification, general characteristics, numbers, and location, experience level, attitude, and skills that impact the training delivery system.

Learner Guide: A print resource used in the instructional process by the participants to enhance the learning during the training and, in some situations, to use as a reference tool following training.

Learner Plan: The portion of the implementation plan that describes how the learners will be selected and prepared to participate in the training includes the following components: identification, schedule, notification, tracking plan.

Learning Context: The actual physical location (or locations) in which the instruction that is under development will be used.

Lesson Plan: A formal design for a particular instructional segment. Lesson plans can range from single-page outlines to comprehensive instructor manuals. Specifically, a lesson plan guides the teacher in producing and delivering the instruction. A lesson plan relates learner outcomes to instructor and student activities for accomplishing the outcomes and to resources required supporting the activities.

Levers of Performance: Common factors that influence the performance of employees such as re-engineering, information, authority, and timely feedback.

Media: The physical means selected or developed to communicate instructional messages. Examples include drawings, slides, audiotape, computer, person, model to name a few.

Media Selection: A function carried out during the development of the instruction whereby various media are selected in order to enhance the quality of the learning, present or reinforce key points, and meet the needs of different learning styles.

Model: Model is defined as an example or pattern that prescribes relationships in a normative sense.

Module: An instructional package with a single integrated theme that provides the information needed to develop mastery of specified knowledge and skills, and serves as one component of a total course or curriculum.

Motor skills: Executive subroutines and past skills: learned through practice describe motor skills.

Multiple-Choice Test Item: A test item that contains a stem setting forth a problem, followed by a correct solution randomly placed among several foils or distracters.

Norm-Referenced Test: Norm-referenced test is the type of test that compares the performance of a student with the performance of other students.

Objectives (Learning): The desired outcomes for the training event (*what the training should accomplish in terms of performance the learners should exhibit in the learning environment in order to be considered competent)* consist of three components (the performance, criterion, and standard), are congruent with the tasks and testing strategies. (Objectives can also be established for on-the-job performance, business or impact performance, or ROI) (often referred to as performance objectives although performance objectives are actually a description of the performance shown on-the-job rather than in the learning environment.)

One-to-One Evaluation: The first stage in formative evaluation, referring to direct interaction between the design team and an individual student.

Performance: Performance is the component of a learning objective that describes what the learner should be able to do at the completion of the instruction.

Performance Analysis: Actions taken to discover the cause of the performance discrepancy.

Performance Discrepancy: (Also known as the performance gap) the gap that exists between what we call *actual performance* (the current performance of the employee) and the *desired performance* (the required or requested performance of the employee).

Performance Test Items: Test items used to determine whether someone can directly apply specific skills and newly constructed knowledge in appropriate situations.

Pilot Test: The last step in the field trial (the third phase of formative evaluation). Students who participate in the pilot test are expected to meet the objectives in the instruction. Data collected from the pilot test is provided to the client who uses it to make the final decision about whether to proceed with implementation.

Posttest: A criterion-referenced test designed to measure performance of objectives to be taught during a unit of instruction, given after the instruction. Typically does not include items on prerequisite knowledge and skills.

Pretest: A criterion-referenced test designed to measure performance of objectives to be taught during a unit of instruction and performance on prerequisite knowledge and skills, given before instruction begins.

Procedure: Procedure describes a sequence of tasks.

Project: A temporary endeavor undertaken to accomplish a unique product or service.

Problem: A condition in which someone desires a certain state of affairs but does not immediately know how to attain it.

Prototype: A functional version of a new process and/or product, usually in an unfinished state, whose effectiveness and efficiency to be tested.

Psychomotor Domain: The division of Bloom's taxonomy of educational objectives that references those objectives and test items demonstrating manipulative or motor skills.

Purpose Statement: A brief statement (approximately 25 words) in which the overarching expectation identified for closing a performance gap is clearly and succinctly stated.

Reliability: The degree to which a test instrument consistently measures the same group's knowledge level of the same instruction repeatedly.

Resource Inventory: Data collected about the resources available to complete all five phases of the ADDIE process. Components include content resources, technology resources, instructional facilities, and human resources.

Short-Answer Test Items: Test items used for determining the degree of students factual recall, where they respond to a question with a brief written answer in a designated space, usually below the question.

Skill: Skill describes something physical, usually involving motor tasks.

Small-Group Evaluation: The second stage of formative evaluation, referring to the use of a small number of tryout students who study an instructional program without intervention from the designer and are tested to assess the effectiveness of the instruction.

Sponsor: This is the person who is paying for the project and who has requested that the project be undertaken. Often referred to as the client.

Storyboarding: A design technique for showing as individual scenes the proposed sequence of visual and audio elements in a production using some form of optically projected media, e.g., television, slid/tape, interactive video.

Summative Evaluation: The process of collecting data following implementation in order to determine the degree to which the instructional goals are being accomplished.

System: System describes interdependence, dynamic, synergistic, and responsive to the environment.

Script: A written document that provides for talent in a film or video production, details about their lines, where to stand, and the timing of their activities.

Subject Matter Expert (SME): This is the person who must take responsibility for the accuracy of the facts, concepts, and other content that will be presented. Subject matter experts are important resources during the instructional design process and should be considered as partners in the ADDIE process.

Synchronous: Any place, but same time.

Systematic: Following procedures or rules describe systematic.

Task Inventory (or Task Analysis): Identifies the primary performances that are required to close the performance gap. A process of identifying, sequencing, and relating the tasks and subtasks to the instructional goals.

Technology Resources: Technology resources include computer, video monitor, LCD (laptop) projector, and flip chart. It is important to evaluate the available technology that is available for the training delivery.

Test Criteria: Test criteria are the component of a learning objective that describes the quality or standard of performance that will be considered acceptable.

Testing Strategy: The type of evaluation conducted during the training in order to determine if the learner met the specified objective (performance, criteria, and condition) is congruent with the related task.

Trainer (Instructor or facilitator): The person who will be presenting the portions of the training that require lecture, facilitation, or other types of live coordination.

Training Delivery Systems: The vehicles available to deliver the training to the learner in order to most effectively provide the outcome desired. Examples include classroom training, computer-based training (CBT), video, web-based training, combination (two or more of the above, for example, classroom with video).

Tryout: the testing of a prototype or some subset of its elements, under actual or simulated conditions that are representative of those in the targeted system.

Validity: The degree to which a test measures what it was designed to measure.

Verbal Information: A network of organized knowledge describes verbal information.

Web-Based Training: Any instructional or training technique, which utilizes the Web environment.

Bibliography

Books

van den Akker, J., Branch, R., Gustafson, K. L., Nieveen, N., & Plomp, T. (Eds.). (2000). *Design approaches and tools in education and training*. New York, NY: Springer.

Anglin, J. G. (Ed.). (1993). *Instructional technology: Past, present, and future* (2nd ed.). Englewood, Colorado: Libraries Unlimited.

Armstrong, A. (2003). *Instructional design in the real world: A view from the trenches*. New York: Idea Group, Incorporated.

Banathy, B. H. (1991). *Educational systems design: A journey to create the future*. Englewood Cliffs, New Jersey: Educational Technology Publications.

Bass, C., & Romiszowski, A. (Eds.). (1997). *Instructional development paradigms*. Englewood Cliffs, NJ: Educational Technology Publications.

Bertalanffy, L. (1968). *General systems theory*. New York: Braziller.

Branch, R., & Fitztgerald, M. (Eds.). (2000). *Educational technology and media technology Yearbook, vol. 25*. Englewood, CO: Libraries Unlimited, Incorporated.

Briggs, L. J., Gustafson, K. L., & Tillman, M. H. (Eds.). (1991). *Instructional design: Principles and applications*, (2nd ed.). Englewood Cliffs, New Jersey: Educational Technology Publications.

Cennamo, K., & Kalk, D. (2005). *Real world instructional design*. Belmont, California: Thomson Wadsworth.

Conrad, K., & Voris, A. C. (Eds.). (2000). *Instructional design for web-based training*. New York: HRD Press.

Dick, W., Carey, L., & Carey, J. O. (2009). *The systematic design of instruction* (7th ed.). Upper Saddle River, New Jersey: Pearson.

Dijkstra, S., Tennyson, R. D., Schott, F., & Seel, N. (1997). *Instructional design: international perspectives*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.

Dills, C. R., & Romiszowski, A. J. (Eds.). (1997). *Instructional development paradigms*. Englewood Cliffs, New Jersey: Educational Technology Publications.

Ertmer, P., & Quinn, J. (2007). *The ID casebook: Case studies in instructional design* (3rd ed.). Upper Saddle River, NJ: Merrill.

Gagné, R. M., Wager, W. W., Golas, K. C., & Keller, J. M. (2005). *Principles of instructional design*, 5th ed. United States: Thomson Wadsworth.

Gardener, H. (1993). *Multiple intelligences: The theory in practice*. New York: Basic Books Incorporated.

Gentry, C. G. (1994). *Introduction to instructional development: Process and technique*. Belmont, CA: Wadsworth Publishing Company.

Gerlach, V. S., & Ely, D. P. (1980). *Teaching and media: A systematic approach* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall Incorporated.

Gilbert, T. (1978) *Human competence: Engineering worthy performance*. New York: McGraw-Hill.

Greer, M. (1996). The project manager's partner: *A step-by-step guide to project management*. Amherst, MA: HRD Press.
Greer, M. (1992). *ID project management: Tools and techniques for instructional designers and developers*. Englewood Cliffs, NJ: Educational Technology Publications.
Gustafson, K. L., & Branch, R. (2002). *Survey of instructional development models, 4th ed.* Syracuse, New York: ERIC Clearinghouse on Information and Technology, Syracuse University.
Harless, J. (1975). *An ounce of analysis is worth a pound of cure*. Newnan, Georgia: Harless Performance Guild.
Johnson, K. A., & Foa, L. J. (1989). *Instructional design: New alternatives for effective education and training*. New York, New York: Macmillan
Jonassen, D. H. (Ed.). (1996). *Handbook of research for educational communications and technology*. New York: Simon & Schuster Macmillan.
Jonassen, D. H., Tessmer, M., & Hannum, W. H. (1999). *Task analysis methods for instructional design*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
Kemp, J., Morrison, G., & Ross, S. (1998). *Designing effective instruction* (2nd ed.). New York: Merrill.
Koper, R., & Tattersall, C. (Eds.). (2005). *Learning design: A handbook on modeling and delivering networked education and training*. New York, NY: Springer.
Ledford, B. R., & Sleeman, P. J. (2002). *Instructional design: System strategies*. Greenwich, Connecticut: Information Age Publishing, Incorporated.
Ledford, B. R., & Sleeman, P. J. (2000). *Instructional design: A primer*. Greenwhich, Connecticut: Information Age Publishing, Incorporated.
Leshin, C. B., Pollock, J., & Reigeluth, C. M. (1992). *Instructional design strategies and tactics*. Englewood Cliffs, New Jersey: Educational Technology Publications.
Mager, R. (1984). *Goal Analysis*. Belmont, CA: Pitman Management and Training.
Mager, R. (1984). *Preparing instructional objectives* (2nd ed.). Belmont, California: Pitman Management and Training.
McCombs, B. L., & Whistler, J. S. (1997). *The learner-centered classroom and school: Strategies for increasing student motivation and achievement*. San Francisco, CA: Jossey-Bass.
McGill, I., & Beaty, L. (1995). *Action learning: A guide for professional, management and educational development* (2nd ed.). London, UK: Kogan Page.
Morrison, G., Ross, S., & Kemp, J. (2001). *Designing effective instruction* (5th ed.). New York: John Wiley & Sons.
Piskurich, G. M. (2006). *Rapid instructional design: Learning ID fast and right* (2nd ed.). New York: Wiley.
Reigeluth, C. M. (Ed.). (1983). *Instructional-design theories and models: An overview of their current status*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
Reigeluth, C. M. (Ed.). (1999). *Instructional-design theories and models: A new paradigm of instructional theory*. Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.
Reigeluth, C. M., & Carr-Chellman, A. A. (Eds.). (2009). *Instructional-design theories and models: Building a common knowledge base* (3rd ed.). New York: Routledge.
Reiser, R. A., & Dempsey, J. V. (2007). *Trends and issues in instructional design and technology* (2nd ed.). Upper Saddle River, New Jersey: Merrill.
Reiser, R. A., & Dick, W. (1996). *Instructional planning: A guide for teachers* (2nd ed.). Boston, Massachusetts: Allyn and Bacon.
Reiser, R., & Gagné, R. (1983). *Selecting media for instruction*. Englewood Cliffs, New Jersey: Educational Technology Publications.
Richey, R. C., Fields, D. C., & Foxon, M. (2000). *Instructional design competencies: The standards, 3rd ed.* Syracuse, New York: ERIC Clearinghouse on Information and Technology, Syracuse University.
Romiszowski, A. J. (1986). *Developing auto-instructional materials*. London: Kogan Page.
Romiszowski, A. J. (1981). Designing instructional systems. London: Kogan Page.

Seels, B. B. (Ed.). (1995). *Instructional design fundamentals: A reconsideration*. Englewood Cliffs, New Jersey: Educational Technology Publications.
Seels, B., & Glasgow, Z. (1998). *Making instructional design decisions* (2nd ed.). Upper Saddle River, New Jersey: Merrill.
Shambaugh, N., & Magliaro, S. G. (2006). *Instructional design: A systematic approach for reflective practice*. New York, New York: Pearson.
Smaldino, S. E., Lowther, D. L., & Russell, J. D. (2007). *Instructional technology and media for learning* (9th ed.). Upper Saddle River, New Jersey: Merrill.
Smith, P. L., & Ragan, T. J. (2005). *Instructional design* (3rd ed.). Hoboken, New Jersey: Wiley-Jossey Education.
Silvern, L. C. (1965). *Basic analysis*. Los Angeles, California: Education and Training Consultants Company.
Spector, M. J., Polson, M. C., & Muraida, D. J. (Eds.) (1993). *Automating instructional design: Concepts and issues*. Englewood Cliffs, New Jersey: Educational Technology Publications.
West, C. K., Farmer, J. A., & Wolff, P. M. (1991). *Instructional design: Implications from cognitive science*. Englewood Cliffs, New Jersey: Prentice Hall, Incorporated.

Book Chapters

Banathy, B. H. (1987). Instructional systems design. In R. M. Gagne (Ed.), *Instructional technology: Foundations* (pp. 85–112). Hillsdale, New Jersey: Lawrence Earlbaum Associates, Incorporated.
Beckschi, P., & Doty, M. (2000). Instructional systems design: A little bit of ADDIEtude, please. In G. Piskurich, P. Beckschi, & B. Hall (Eds.), *The ASTD handbook of training design and delivery*. New York: McGraw-Hill.
Bereiter, C., & Scardamalia, M. (1989). Intentional learning: As a goal of instruction. In L. B. Resnick (Ed.), *Knowing, learning, and instruction: Essays in honor of Robert Glaser* (pp. 361–392). Hillsdale, NJ: Lawrence Erlbaum Associates.
Branch, R. (2000). Instructional design: A parallel processor for navigating learning space. In J. van den Akker, R. Branch, K. L. Gustafson, N. Nieveen, & T. Plomp (Eds.), *Design approaches and tools in education and training* (pp. 145–154). New York, New York: Springer.
Branch, R. (1997). Perceptions of instructional design process models. In R. E. Griffin, D. G. Beauchamp. J. M. Hunter, & C. B. Schiffman (Eds.), *Selected readings of the 28th annual convention of the international visual literacy association*. Cheyenne, Wyoming.
Branch, R. (1996). Instructional design as a response to the complexities of instruction. In N. Venkataiah (Ed.), *Educational Technology* (pp. 21–49). New Delhi: Ashish Publishing House.
Burton, J., Moore, D., & Magliaro, S. (1996). Behaviorism and instructional technology. In D. Jonassen (Ed.), *Handbook of research for educational communications and technology*. New York: Macmillan.
Dorsey, L., Goodrum, D., & Schwen, T. (1997). Rapid collaborative prototyping as an instructional development paradigm. In C. Dills & A. Romiszowski (Eds.), *Instructional development paradigms* (pp. 445–465). Englewood Cliffs, NJ: Educational Technology Publications. (ERIC Document Reproduction Service No. ED 407 932)
Earle, R. (1998). Instructional design and teacher planning: Reflections and perspectives. In R. Branch & M Fitzgerald (Ed.), *Educational technology and media yearbook* (pp. 29–41). Englewood, Colorado: Libraries Unlimited.
Goodyear, P. (1997). Instructional design environments: Methods and tools for the design of complex instructional systems. In S. Dijkstra, N. Seel, F. Schott, & R. Tennyson (Eds.), *Instructional design: International perspectives,* Vol. 2. Mahwah, NJ: Lawrence Erlbaum Associates.

Gustafson, K. L., & Branch, R. (2007). What is instructional design? In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology* (2nd ed.) (pp. 11–16). Upper Saddle River, New Jersey: Merrill-Prentice Hall.

Land, S. M., & Hannafin, M. J. (2000). Student-centered learning environments. In D. H. Jonassen & S. M. Land (Eds.), *Theoretical foundations of learning environments* (pp. 1–23). Mahwah, NJ: Erlbaum.

Merrill, D. M. (1983). Component display theory. In C. M. Reigeluth (Ed.), *Instructional-design: Theories and models: An overview of their current status* (pp. 279–334). Hillsdale, New Jersey: Lawrence Earlbaum Associates, Incorporated.

Reigeluth, C. M., & Nelson, L. M. (1997). A new paradigm of ISD? In R. Branch & B. Minor (Eds.), *Educational Media and Technology Yearbook, 22*, 24–35. Englewood, Colorado: Libraries Unlimited.

Rossett, A. (1993). Needs assessment. In G. J. Anglin (Ed.), *Instructional technology: Past, present, and future* (2nd ed.) (pp. 156–169). Englewood, Colorado: Libraries Unlimited.

Seel, N. (1997). Models of instructional design: Introduction & overview. In R. Tennyson, F. Schott, N. Seel, & S. Dijkstra (Eds.), *Instructional design: International perspectives,* Vol. 1. Mahwah, New Jersey: Lawrence Erlbaum Associates.

Stufflebeam, D. L. (1983). The CIPP Model for program evaluation. In G. F. Madaus, M. S. Scriven & D. L. Stufflebeam (Eds.), *Evaluation models: Viewpoints on educational and human service evaluation* (pp.117–142). Boston: Kluwer-Nijhoff.

Visscher-Voerman, I., Gustafson, K., & Plomp, T. (2000). Educational design and development: An overview of paradigms. In van den Akker, J., Nieveen, N., & Plomp, T. (Eds.), *Design methodology and developmental research in education and training*. Twente, The Netherlands: Kluwer Academic Publishers.

Articles

Altun, S., & Büyükduman, F. (2007). Teacher and student beliefs on constructivist instructional design: A case study. *Educational Sciences: Theory & Practice, 7*(1), 30–39.

Andrews, D. H., & Goodson, L. A. (1980). A comparative analysis of models of instructional design. *Journal of Instructional Development, 3*(4), 2–16.

Angeli, C., & Valanides, N. (2005). Preservice elementary teachers as information and communication technology designers: An instructional systems design model based on an expanded view of pedagogical content knowledge. *Journal of Computer Assisted Learning, 21*(4), 292–302.

Bannan-Ritland, B. (2001). Teaching instructional design: An action learning approach. *Performance Improvement Quarterly, 14*(2), 37–52.

van Berlo, M., Lowyck, J., & Schaafstal, A. (2007). Supporting the instructional design process for team training. *Computers in Human Behavior, 23*(3), 1145–1161.

Braden, R. A. (1996). The case for linear instructional design and development: A commentary on models, challenges, and myths. *Educational Technology, 26*(3), 5–23.

Branch, R. (1994). Common instructional design practices for secondary school teachers. *Educational Technology, 34*(3), 25–33.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32–42.

Cennamo, K. (2003). Design as knowledge construction: Constructing knowledge of design. *Computers in the Schools, 20*(4), 13–35.

Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research, 53*(4), 445–458.

Cook, M. (2006). Visual representations in science education: The influence of prior knowledge and cognitive load theory on instructional design principles. *Science Education, 90*(6), 1073–1091.

Dick, W. (1996). The Dick and Carey model: Will it survive the decade? *Educational Technology Research and Development, 44*(3), 55–63.

Dickey, M. D. (2006). Girl gamers: The controversy of girl games and the relevance of female-oriented game design for instructional design. *British Journal of Educational Technology, 37*(5), 785–793.

Edmonds, G., Branch, R., & Mukherjee, P. (1994). A conceptual framework for comparing instructional design models. *Educational Technology Research and Development, 42*(4), 55–62.

Fox, E. J. (2006). Constructing a pragmatic science of learning and instruction with functional contextualism. *Educational Technology Research and Development, 54*(1), 5–36.

Gustafson, K. L. & Branch, R. (1997). Revisioning models of instructional development. *Educational Technology Research and Development, 45*(3), 73–89.

Hannafin, M. J. (2006). Functional contextualism in learning and instruction: Pragmatic science or objectivism revisited? *Educational Technology Research and Development, 54*(1), 37–41.

Hannafin, M. J., & Hill, J. R. (1997). Student-centered learning and interactive multimedia: Status, issues, and implication. *Contemporary Education, 68*(2), 94–99.

Hannafin, M. J., Hill, J. R., & Land, S. M. (1997). Student-centered learning and interactive multimedia: Status, issues, and implications. *Contemporary Education, 68*(2), 94–97.

Hannafin, M. J., & Land, S. M. (1997). The foundations and assumptions of technology-enhanced student-centered learning environments. *Instructional Science, 25*(3), 167–202.

Hoogveld, A., Paas, F., Jochems, W., & Van Merrienboer, J. (2002). Exploring teachers' instructional design practices from a systems design perspective. *Instructional Science, 30*(4), 291.

Howe, R. J., & Pearlstein, G. (1995). Shortcuts for pilot testing instructional materials. *Performance and Instruction, 34*(2), 34–37.

Hughes, M. A. (1998). Active learning for software products. *Technical Communications, 45*(3), 343–352.

Kember, D. (1991). Instructional design for meaningful learning. *Instructional Science, 20*(4), 289–310.

Kester, L., Kirschner, P., & Corbalan, G. (2007). Designing support to facilitate learning in powerful electronic learning environments. *Computers in Human Behavior, 23*(3), 1047–1054.

Kissell, J. (1997). Understanding and dealing with client resistance. *Performance Improvement, 36*(1), 10–13.

Koper, R., Giesbers, B., van Rosmalen, P., Sloep, P., van Bruggen, J., Tattersall, C., et al. (2005). A design model for lifelong learning networks. *Interactive Learning Environments, 13*(1–2), 71–92.

Magliaro, S., & Shambaugh, N. (2006). Student models of instructional design. *Educational Technology Research & Development, 54*(1), 83–106.

McAlpine, L. (1992). Highlighting formative evaluation: An instructional design model derived from practice. *Performance and Instruction,* December, 16–18.

Merrill, M. D. (1997). Learning-oriented instructional development tools. *Performance Improvement, 36*(3), 51–55.

Van Merrienboer, J. J. G., & Sweller, J. (2005). Cognitive load theory and complex learning: Recent developments and future directions. *Educational Psychology Review, 17*(2), 147–177.

Merrill, M. D., Drake, L., Lacy, M. J., Pratt, J., & The ID2 Research Group at Utah State University. (1996). Reclaiming instructional design. *Educational Technology, 26*(7), 5–7.

Moallem, M., & Earle, R. S. (1998). Instructional design models and teacher thinking: Toward a new conceptual model for research and development. *Educational Technology, 38*(2), 5–22.

Nadolski, R. J., Kirschner, P. A., van Merrienboer, J. J. G., & Woretshofer, J. (2005). Development of an instrument for measuring the complexity of learning tasks. *Educational Research and Evaluation, 11*(1), 1–27.

Orlin, J. P. (1992). The mix that makes a good instructional designer. *Technical & Skills Training,* October, 13–17.

O'Neil, H. F., Wainess, R., & Baker, E. L. (2005). Classification of learning outcomes: Evidence from the computer games literature. *Curriculum Journal, 16*(4), 455–474.
Ritchie, D., & Earnest, J. (1999). The future of instructional design: Results of a Delphi study. *Educational Technology, 29*(1), 35–42.
Rowland, G., Fixl, A., & Yung, K. (1992). Educating the reflective designer. *Educational Technology,* December, 36–44.
Salter, D., Richards, L., & Carey, T. (2004). The "T5" design model: An instructional model and learning environment to support the integration of online and campus-based courses. *Educational Media International, 41*(3), 207–218.
Schwabe, G., & Goth, C. (2005). Mobile learning with a mobile game: Design and motivational effects. *Journal of Computer Assisted Learning, 21*(3), 204–216.
Schwartzman, R. (2006). Virtual group problem solving in the basic communication course: Lessons for online learning. *Journal of Instructional Psychology, 33*(1), 3–14.
Scriven, M. (2002). An overview of evaluation theories. *Evaluation Journal of Australasia, 1*(1), pp. 61–69.
Song, H.-D., Grabowski, B. L., Koszalka, T. A., & Harkness, W. L. (2006). Patterns of instructional-design factors prompting reflective thinking in middle-school and college level problem-based learning environments. *Instructional Science: An International Journal of Learning and Cognition, 34*(1), 63–87.
Stubbs, M., Martin, I., & Endlar, L. (2006). The structuration of blended learning: Putting holistic design principles into practice. *British Journal of Educational Technology, 37*(2), 163–175.
Stufflebeam, D. L., & Webster, W. J. (1980). An analysis of alternative approaches to evaluation. *Educational Evaluation and Policy Analysis, 2*(3), 5–19.
Tessmer, M., & Wedman, J. (1995). Context-sensitive instructional design models: A response to design research studies and criticism. *Performance Improvement Quarterly, 8*(3), 38–54.
Tennyson, R., & Barron, A. E. (Eds.). (1995). *Automating instructional design: Computer-based development and delivery tools. Proceedings of the NATO advanced study institute on automating instructional design: Computer-based development and delivery tools, held in Grimstad, Norway, July 12–23, 1993*. New York, New York: Springer.
Tripp, S., & Bichelmeyer, B. (1990). Rapid prototyping: An alternative instructional design strategy. *Educational Technology Research & Development, 38*(1), 31–44.
Van Gerven, P. W. M., Paas, F., & Tabbers, H. K. (2006). Cognitive aging and computer-based instructional design: Where do we go from here? *Educational Psychology Review, 18*(2), 141–157.
Verstegen, D. M. L., Barnard, Y. F., & Pilot, A. (2006). Which events can cause iteration in instructional design? An empirical study of the design process. *Instructional Science: An International Journal of Learning and Cognition, 34*(6), 481–517.
Wang, H. (2007). Performing a course material enhancement process with asynchronous interactive online system. *Computers & Education, 48*(4), 567–581.
Wedman, J., & Tessmer, M. (1991) Adapting instructional design to project circumstance: The layers of necessity model. *Educational Technology, 21*, 48–52.
Westgard, O. (1997). Editor's notes. *Performance Improvement, 36*(4), 3.
Yancey, C. (1995). The ABCs of working with SMEs. *Performance and Instruction, 35*(1), 6–9.
You, Y. (1993). What we can learning from chaos theory? An alternative approach to instructional systems design. *Educational Technology Research and Development*, 41(3).
Zuber-Skerritt, O. (2002). The concept of action learning. *The Learning Organization, 9*(3), 114–124.

Internet

Thiagarajan, S. (1999). *Rapid instructional design*. Retrieved 10 February 2009, from http://www.thiagi.com/article-rid.html

Index