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Starting Out

Using the Instructional Systems Design (ISD) Model

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KNOWING TECHNOLOGY does not mean knowing how to do training. In fact, overemphasizing technology can diminish an appropriate emphasis on meeting learner needs. It is therefore fitting to begin with a review of what it takes to create good training that meets training needs.

How can an approach called instructional systems design be used to design effective training? Why is the so-called ADDIE model of instructional systems design an appropriate starting point for training? What are the steps in the ADDIE model, and how should trainers use them? And finally, what special attention should be devoted to the first steps in the ADDIE model—that is, analysis and design? In addressing these important questions, this chapter lays the foundation for the remainder of the book by emphasizing the importance of the term training in the phrase technology-assisted training.

Training and Instructional Systems Design

Training may be delivered informally. Simply pairing up a new worker to watch an "old hand" work is one way to train someone. And, of course, that informal approach is often used in organizations that lack training sophistication.

Training may also be carefully planned and delivered in a way that ensures that workers know how to do their jobs when they finish. Instead of organizing the training around the daily work process of an experienced worker—which is what happens when a newcomer is paired up to watch an "old hand"—effective training begins with an analysis of the work, the learners, the work setting, and the working conditions in which the work is to be carried out. Instructional systems design (ISD) means approaching training in a systematic way with a view toward improving worker performance. Invented by the U.S. military to train troops, ISD has gradually become a standard for worker training in many business settings.

The ADDIE Model: A Guide to Instructional Systems Design

Although ISD has been variously described, all the descriptions share some common characteristics. There are over 100 different ISD models, but most are based primarily on the generic ADDIE model (Kruse, n.d.). Effective and systematically planned training requires

- Analysis
- Design
- Development
- Implementation (Delivery)
- Evaluation

The combined first letters of each step in this process form the acronym ADDIE. This well-recognized approach to systematic training design is widely known and is used by many trainers, regardless of what training they design or deliver.

The requirements of these steps are logical—as the detailed description of the steps in the next section will show—and it would seem essential that everyone would just naturally use each step in every training project. But that is not always the case in the real world. Steps are sometimes skipped, resequenced, added, or performed concurrently.

There are understandable reasons why that happens. For instance, training may have to be prepared on a "short fuse." The perception in the organization may be that the "real work" of creating the training materials must start immediately to save time. Analysis may be deemphasized or skipped altogether if managers assume they already know what the problem is and already thoroughly understand the root causes of performance problems. Design may be performed during rather than prior to developing a training solution. But one result of not fully following the required steps is that the training becomes ineffective because root causes were not carefully delineated or perhaps were never really identified at all.

What Are the Steps in the ADDIE Model?

As already mentioned, the ADDIE model comprises logical steps to prepare effective training. It is worth taking time to describe each step and explain what each step means for trainers. After all, technology-assisted training can only be successful if the training itself is effective.

Analysis

Analysis is the first step in the ADDIE model. In this step trainers analyze what people must know and do to perform their work effectively. If this step is not handled well, the training cannot be effective.

Analysis consists of two steps. The first step is performance analysis, the process of distinguishing problems that can be solved by training from those that must be solved by management action. The second step is needs analysis, the process of clarifying what people must know, do, or feel to perform successfully.

The Goals of Analysis. Analysis has two goals. The first, accomplished through performance analysis, is to pinpoint what problems can actually be solved by training and what problems must be solved by management action. The second, accomplished by needs analysis, focuses attention on who will receive training (and what they already know or can do), what workers must know precisely to perform their work successfully, and under what conditions they must carry out their work.

Key Questions to Be Answered During Analysis. Trainers who conduct performance analysis must address the following questions:

- Could people perform this work or task if their lives depended on it? (If not, then it is a training need. Otherwise, management action should be taken instead.)
- Have people performed the work or task successfully before? (If not, then it is a training need. Otherwise, management action should be taken instead.)

Trainers who conduct needs analysis pose additional questions once an issue has been shown to be a problem that can be solved by training:

- Who (exactly) is targeted to receive the training? (This is called learner analysis.)
- What is involved in carrying out the work? (This is called task analysis or work analysis.)
- How well must the trainees perform upon completion of training, and how is successful performance measured? (This should be addressed in task or work analysis.)
- Under what working conditions will the trainees perform the task or work when they return to their job? (This is called setting analysis.)

Many Web-based resources are available to provide help to trainers in conducting needs assessment. (See the Web Links sidebar.)

WEB LINKS TO RESOURCES FOR TRAINING NEEDS ASSESSMENT

See the following sites on the Web for resources to assist in conducting training needs assessment:

http://217.205.66.230/VTS/form/first.asp

http://www.work911.com/products/i-ctrainingneeds.htm

http://www.articles911.com/Training/Training_Needs_Assessment/

http://adulted.about.com/od/trngneedsasst/

http://adulted.about.com/gi/dynamic/offsite.htm?zi=1/XJ&sdn=adulted&zu=http%3A%2F%2Fmime1.marc.gatech.edu%2FMM_Tools%2Fanalysis.html

Design

Design is the second step in the ADDIE model. It examines how the training should be planned so that it will meet identified training needs. In short, it shifts the focus from investigating the problem, which is the key issue in analysis, to investigating and scoping the solution.

The Goal of Design. The chief goal of design is to determine what training experience will meet training needs and thereby close performance gaps between what people can do and what they must do to meet performance requirements.

Key Questions to Be Answered During Design. Trainers engaged in design will focus their attention on addressing these questions:

- What should participants do upon completion of the training?
- How will their ability to perform be measured upon completion of the training?
- What equipment, tools, or other resources do participants need to demonstrate their knowledge, skill, or attitudes?
- What instructional materials or events should be used to meet training needs?

Development

Development, the third step in the ADDIE model, is the process of making, buying, or buying and modifying training materials to achieve the training objectives identified during the design phase. It also involves choosing the best medium (or media) by which to deliver the training.

The Goals of Development. The chief goals of development are (1) to build, buy, or buy and revise training material to achieve identified training objectives, and (2) to select the best medium (or combination of media) by which to achieve the training objectives.

Key Questions to Be Answered During Development. Trainers engaged in development will focus their attention on addressing the following questions:

- What training materials may be purchased from others, such as commercial publishers or training vendors, to meet training needs?
- What training materials must be prepared to meet the unique needs of learners in the organization?
- What training materials can be purchased from external sources and modified to meet the learners' unique needs in the organization?
- What medium or combination of media will strike a balance between being effective with learners and cost-effective for the organization?

Implementation (Delivery)

Implementation (delivery), the fourth step in the ADDIE model, is perhaps the one most associated with training. It is the most visible and what operating managers and workers actually see. During implementation, training is delivered.

The Goals of Implementation (Delivery). The chief goals of implementation are to (1) guide the learners through the learning event and (2) ensure that learners have narrowed or closed the gaps between what they know, do, or feel upon the outset of training and what they know, do, or feel upon completion of training.

Key Questions to Be Answered During Implementation (Delivery). Trainers engaged in implementation will focus attention on addressing these questions:

- What training methods are most effective with the learners who receive the training?
- How can participation and interest be captured and sustained throughout the training experience?

Evaluation

Evaluation is the fifth and final step in the ADDIE model. Evaluation is a process of placing value on training. Although it is listed last, evaluation actually occurs throughout the training process. The needs identified in the analysis phase become a foundation for evaluation by clarifying what learners must know, do, or feel upon completion of training to perform effectively. The results of training can then be compared to the identified needs.

The Goals of Evaluation. The goals of evaluation are to assess the degree to which people (1) liked the training, (2) learned from the training, (3) changed their behavior back on the job as a direct result of the training, and (4) produced results of value to the organization back on the job.

Key Questions to Be Answered During Evaluation. During evaluation, trainers seek to answer such questions as

- How much do the learners like the training?
- How much did people learn from the training?
- How much did people apply what they learned in training back on their jobs?
- How much did the organization gain in enhanced revenue or decreased costs as a direct result of the training?

Benefits of Devoting Special Attention to Analysis and Design

Since this is the first chapter of this book, it is worth devoting some special attention to the first steps in the ADDIE model—that is, analysis and design. After all, they are essential to the success of any training program. Table 1.1 depicts a high level view of possible tasks for the analysis and design steps of the ISD model.

Table 1.1. High-Level Tasks of the Analysis and Design Steps in the Instructional Design Model.

Model Steps	High-Level Task Overview
Analysis	Purpose and training goals Learner analysis Training components Training development plan Executive summary
Design	Performance objectives Learning domains Instructional strategy Instructional delivery methods Assessment instrument

Steps in the Analysis Phase

Analysis is the most overlooked step in the creation of training interventions. Skipping this step—or doing only a cursory job with it—is sure to present obstacles later in the process. When trainers who specialize in preparing Web-based training were asked to identify obstacles to the successful completion of their Web-based training projects, they quickly noted many causes stemming from poor or nonexistent analysis (Hunt, 1999). Judge for yourself—read trainers' exact words from a survey (Hunt, 1999, pp. 6, 32, 112):

The biggest obstacle I face in doing training is . . .

- Lack of understanding of instructional systems design and instructional technology. People do not know that training is supposed to be performance based. People wanted to rush into the project and do something. The first project failed for two reasons. (1) Incomplete because of lack of storyboard. It ran all over the place and had no end in sight. It was difficult in both time and money to fix as

screens were constantly modified. (2) End product was all knowledge-based and when viewed there was the realization that it could have been a book or video, which would have been less expensive to develop. After the failure, the manager re-listened to our overview of the ISD process and allowed front-end analysis. Product was then performance based and successful.

- Trying to get anyone to come to development meetings (during the design phase) instead of after it's all done and then having to make tons of changes because they didn't "have any input." Duh!
- Initially, the pages were designed with a minimum amount of functionality. As the module grew, we added more features. But as features were added, we ended up having to re-design the module. Rather than building on a module, in the future, I will start with the entire finished product in mind rather than developing and adding features as we go along.

Analysis is crucial to the successful, timely outcome of technology-assisted training. Technology has too often added new "unknowns" to a training solution, thus inadvertently creating large tasks with unknown or long lead times. Unless analysis is performed, many issues may be overlooked until they grow into problems.

The outcome of the analysis step should take the form of an analysis document that communicates the results of the analysis. This document should identify the instructional methods and technologies to be used and control the scope—what will and will not be included—of the training effort. An analysis document is tailored to meeting specific training needs, so some companies have a prescribed method for creating it. The document may include (Dick, Carey, & Carey, 2000; Sandholtz, Ringstaff, & Dwyer, 1997):

- Purpose and training goals
- Analysis of targeted learners
- Training components
- Training development plan
- Executive summary

Anything relevant to a training intervention should thus be included. Custom-tailored categories, grids, and charts often help clarify what the training effort will encompass.

Clarifying the Purpose and Training Goals. This component of an analysis document should describe the purpose, training goals, and learners to be served by the training program.

A purpose statement is a guiding statement about what the training is to accomplish. This statement explains why the training is needed. It should make sense to top managers, addressing the organization's mission or goals and showing how training fits into the organization's bottom line. A purpose statement is usually only a sentence or two.

Training goals clarify what will be achieved by a training intervention. They specify what must occur to constitute successful training and identify measurable goals that can be linked to the organization's mission. Training needs vary; they can span departments, solutions, and topics. For example, rolling out a new product requires training on how to use the product, how to sell it, how to order it, how to troubleshoot it, how to contact the company, and much more. Each training need may be met in different ways and presented to different learners. As one project, however, they should be analyzed, designed, developed, implemented, and paid for under one training umbrella.

Business processes are an important part of analysis. Change does not occur in a vacuum. Whatever prompts the need for new training will prompt other changes in how business is done. Identifying these changes in business process early will increase the likelihood of a successful training effort. Understanding and articulating the business processes that will be affected by a training intervention will aid in determining whether current business processes need to be updated.

Clarifying the Needs of Learners. A learner analysis is important to understand the targeted participants that training is intended to reach. Consider the learners, their learning styles, time available, previous training experiences, attitudes toward training, and corporate culture. Determining what learners will do on the job after the training is absolutely essential.

A natural outcome of this analysis is a chart of learners' roles, tasks, responsibilities, and required skills. Called a learner grid, it is a table that organizes learners, training components, and other information in one convenient place. It aids in targeting the training and answers logistical questions about an intervention, such as how many learners there are, whether the training will be done by department or job title, and other essential issues. Any supplementary tables, graphics, or spreadsheets that clarify who the learners are, and which components will be targeted to them, should be included to communicate clearly and comprehensively what is going to happen in the training. An example of a simple learner grid is depicted in Table 1.2.

Table 1.2. Sample Learner Grid.

	Engineers	Accounting Department	Sales Representatives	Phone Center Support
Training for product A	8	0	34	34
Training for product B	12	0	34	22
Training on how to order	0	14	34	4

Technology may be one issue worthy of attention during the analysis. As learners are separated into groups, trainers may identify which groups may be more receptive than others to technology-assisted training. For example, engineers can be provided with a set of Web-based materials to study before attending traditional classroom training. That change alone could reduce the time spent in the classroom, slash travel costs, and reduce the unproductive time that learners must spend away from the office. For the sales group, a current reference manual for a new product may be as important as classroom training. By providing this reference set over the Internet, classroom training for sales people can be focused on issues of specific interest to them.

Clarifying the Training Components. Training components may include descriptions of the training context, learning objectives, materials, delivery methods, and logistics.

A training context specifies what training will be developed, as well as when, where, and how it will be delivered. The context includes information on the types of materials to be produced, methods of delivery, and logistics of physical materials required for developing and delivering training. This document usually includes grids detailing what materials, delivery methods, or logistical items will be targeted at specific training needs. If technology-assisted training will be used, the context details the why's and how's of these technologies.

Learning objectives provide details about what the training will accomplish. The classic components of learning objectives include (1) what a learner can do upon completion of training, (2) what working conditions under which the performance is to be demonstrated, and (3) how well learners must perform for training to be considered successful and complete.

Training materials communicate what the training will cover and how the training will cover it. Examples of materials include sample computer screens, storyboards, prototypes, sample reports, job aids, help desk procedures, frequently asked questions (FAQs), sample worksheets, tables of contents, transcripts of video and audio clips, flow charts, and assessments.

In the early stage of developing training, these examples do not need to look professional. Simple rough drafts sufficiently communicate what the training will cover. Examples of materials from the training are often presented in an appendix to the analysis document or in a separate attachment.

Delivery methods clarify how training will reach the learners. This component outlines where training will take place and how it will be accessed.

Logistics summarize elements that will be necessary for the training. Listing logistical concerns can reduce the time needed to secure essential equipment or physical space that is required to develop and deliver training. Common logistical items include labs, phone lines, satellite feeds, and computer and Internet access.

Training and Development Plan. It is crucial to anticipate how training will be developed and what resources will be required. A training and development plan supplies information about teams, dependencies, sign-offs, scheduling, and potential risks and conflicts. The next few paragraphs describe a basic development plan. Large training efforts that span several months, departments, or technologies may necessitate more detailed project plans.

Preparing technology-assisted training is almost always a team effort for the simple reason that no one person usually possesses all the skills needed to design and deliver it. One experienced trainer stated that the biggest obstacle to the success of a training project was a "lack of understanding among team members about how people with different skills and viewpoints could contribute to the whole." This problem was overcome by "training team members about how teams work, what stages that teams go through, and by presentations from different disciplines to increase understanding" (Hunt, 1999, p. 85).

On a team, many people with a range of skills must be cooperative to achieve a common goal. Managers, writers, programmers, instructional designers, subject matter experts, executives, technology engineers, and instructors work together on various functional teams. For example, a technology team sets up and troubleshoots hardware, networks, Web sites, or other technical training needs. A subject matter expert team defines the content of the training and reviews the technical accuracy of the training content prepared in development. A support team helps with technology issues and business process issues. An instructional design team analyzes and designs a training intervention. People possessing the technical expertise to put the design into action serve on a development team. A management team is responsible for making decisions, solving problems, and addressing issues of project scope.

Information about teams should appear in the analysis document. This information typically should include (1) team rosters with names, phone numbers, and e-mail addresses, (2) charts of how teams are organized, and (3) grids showing when each team will be needed throughout design, development, and implementation stages.

Dependencies identify and communicate what is expected from the organization outside of the training department. Successful training depends upon people being hired or assigned, the purchase or procurement of technology, managerial approval, access to subject matter experts, software updates, and even employee vacation schedules. These are examples of dependencies.

A sign-off document lists major milestones, identifying who has authority to sign off on them. These milestones may be phases of training design, development and implementation, or they may be based on specific training components. All training is limited by time, cost, and technology limitations; a responsible party signing off on a portion of the work declares that work done. The sign-off document helps control the scope of a training effort. For example, if a training design has been approved (signed), the design document then becomes a guideline for the project's scope.

A sign-off document also serves to establish ownership from those having a stake in the success of the training. A manager or subject matter expert who is required to sign off on a training design will be likely to read the design document very carefully. Writers will not sign off until the instructional content is complete and adequate. Testing or quality assurance employees have a vested interest in the precision of their work if they must sign off on it. Because various project phases overlap in actual training development, sign-offs limit a project to its desired scope.

Obviously, training projects require scheduling. A useful schedule anticipates a completion date and indicates which people will be required at each project phase. If a training project must dovetail with a larger business effort, scheduling becomes even more crucial because it involves other departments and may require longer lead times.

Finally, during the analysis phase it is critical to identify potential risks and conflicts. Examples may include having key people unavailable at key points in the process, using products still under development, relying on technologies that are not yet installed or available, or competing with other projects for time, money, or people. The most prevalent risk in training efforts today is lack of experience with technology, instructional design, or project management. Over three-fourths of all respondents in Hunt's (1999) study

of obstacles in using technology-assisted training identified lack of knowledge as a major obstacle to the successful completion of training.

Executive Summary. Though the executive summary appears first in the completed analysis document, it is generally the last section written. It communicates the purpose and scope of a training project to corporate executives and provides justification for training. It outlines the resources necessary for it and includes a cost-benefit analysis. Essentially, the executive summary offers a "big picture" view of how training fits into larger projects or corporate strategies. It is typically very brief, containing only the most useful information and graphics pulled from other parts of the analysis document.

Steps in the Design Phase

It is essential that training requirements are understood, written down in clear purpose statements (called performance objectives), and communicated. Performance objectives guide the people designing, conducting, and receiving training. Each situation listed below indicates a problem that stems from a lack of clear purpose for a training intervention:

A manager cannot see any benefits in the training course that upper management has requested her staff to attend.

An employee does not know which part of the online training course to take.

The training staff finds it difficult to determine what information should be included in the training course.

The training manager cannot communicate the benefits (return on investment, or ROI) of the training courses offered.

One professional clarified the importance of instructional design this way: "The largest obstacle [to training] was the people not understanding the time needed to complete the Instructional Design phase. This was overcome by providing training to the people involved in the Instructional Design phase AND to the other people involved in the project so they would know what

to expect and when to expect it. The cause of the problem was that as people moved from the classroom to the online environment, they did not understand the need to design the whole course in advance rather than on a just-in-time basis like in the classroom" (Hunt, 1999, p. 69).

The design phase is critical in technology-assisted training. The need to devote time and attention to it cannot be overstated. Many books have been written on designing effective instruction (Dick, Carey, & Carey, 2000; Hall, 1997; Khan, 1997; Morrison, Ross, & Kemp, 2001).

The design phase consists of three key parts:

- Writing the performance objectives
- Selecting instructional strategy
- Identifying or preparing an assessment instrument

Writing the Performance Objectives. Performance objectives, sometimes called training objectives or instructional objectives, clarify what learners know, do, or feel upon completion of training. They are created based on the goals and business processes identified in the analysis step.

Performance objectives serve four important purposes. First, they guide the trainer by helping to determine what information should be included in the training and in what order that information should be presented. Second, they guide the instructor. They provide valuable insight about the importance of each training segment by offering clear statements about the skills and knowledge that learners should possess upon course completion. Third, they guide learners by providing an overview of the skills and knowledge that training will cover. They can indicate what areas learners should review before attending training or what learners should study before taking examinations. Fourth and finally, performance objectives create a framework for evaluating the success of both the learners and the training course.

Performance objectives can be classified into three major domains. First is the cognitive domain, which focuses on imparting information and knowledge. Second is the psychomotor domain, which involves improving physical activities such as the performance of a specific task or the manipulation

of equipment. Third is the affective domain, concerned with attitudes, values, and emotions.

The goals of a training intervention may require training for multiple learning domains. For example, teaching someone how to operate machinery typically requires knowledge-based instruction (cognitive domain), as well as supervised practice (psychomotor domain). To be effective, a performance objective must match the learning domain of its intended outcome.

How should performance objectives be written? To answer that question, realize that any performance objective is a precise statement that explains what behaviors learners should demonstrate when training is completed. Objectives begin with action verbs followed by the description of a specific skill or piece of knowledge. To cite a few examples of simple performance objectives, examine these:

- Complete a sales order.
- Use a word processing application.
- Troubleshoot computer hardware problems.

More information is required to describe instructional objectives completely. Trainers should also describe levels of achievement and conditions of performance.

The matter of levels of achievement answers questions such as "How accurate?" or "Over what period?" For example, "complete a sales order" could become "complete a sales order within one minute." "Use a word processing application" could become "use a word processing application to create a meeting agenda."

The issue of conditions of performance answers questions such as "Is access to equipment required?" or "Are any specific conditions required or limitations imposed?" For example, "Use a word processing application" could become "given a rough draft of a document, use a word processing application to create a table of contents, insert graphs, and number the pages."

Developing performance objectives requires practice, but it is crucial to effective training design. If trainers are not clear about what learners are to do upon completion of training, much time, and many resources, may be wasted.

Selecting Instructional Strategy. Instructional strategies specify how material will be taught, presented, or shown to learners. Each performance objective may require a different instructional strategy, because objectives are focused on different performance outcomes. The performance-content matrix divides learning into the following six levels (Merrill, 1983): (1) facts, (2) concepts, (3) principles and rules, (4) procedures, (5) interpersonal, and (6) attitude.

Each level builds on the previous one. For example, if a performance objective involves teaching a concept, instructional strategies for teaching both facts and concepts must be included. The key here is to look at each performance objective individually and then determine the best strategy to help learners achieve that objective. Instructional strategies typically include an initial presentation and a follow-up to make the content meaningful and encourage active learning (Dick, Carey, & Carey, 2000; Hall, 1997; Khan, 1997; Morrison, Ross, & Kemp, 2001).

Instructional strategies are widely known. They may include attention activities, audiovisual materials, brainstorming, business games, buzz sessions, case studies, chalkboards or whiteboards, comparisons, demonstrations, examples, expert panels, games, group discussions, lectures, behavioral modeling, music, object lessons, panel discussions, practical exercises, programmed instruction, questions, guided reading, role plays, simulations, stories, surveys, visuals, or worksheets—to name but a few.

As trainers determine possible instructional strategies to use, they must think of how to use technology assistance. Case studies, for instance, can be viewed not just in the classroom but over the Web or on a CD, as Chapter Twelve of this book will show. Demonstration can be done in Microsoft PowerPoint or other electronic applications and viewed in the classroom, over the Web, or on a CD. Take a few minutes to look at the list of instructional strategies above and brainstorm ways to use technology to increase classroom effectiveness or decrease how much classroom time is required.

Instructional strategies are designed for use throughout all phases of instruction. The phases of instruction include pre-instruction, presentation, practice, and evaluation.

Pre-instructional strategies capture attention and prepare participants for learning. They can also be used to evaluate where learners are starting from in terms of knowledge and skills. Technology can play a huge part in pre-instruction. Providing models that include basic elements of the training a week or two before the classroom training will allow time for the concept to be understood and could reduce the amount of time in the classroom.

Presentation strategies are at the heart of most training interventions. It is important to vary presentation strategies in order to maintain interest among learners.

Instructional strategies that encourage practice are often not used enough in instructional design. Practice consolidates learning, clarifying the knowledge and skills required for adequate performance. If technology can be used to allow practice outside the classroom, many learners will take advantage of the opportunity and thereby enhance their learning.

Learners can be evaluated in various ways. Hence, evaluation strategies—designed to assess how well people learned—can take many forms. Instructional strategies such as case studies and worksheets are very effective in determining what has been learned. Evaluation instruments or formal certifications of performance are often required to validate that training has built the competence required for job and organizational success.

As part of their instructional strategies, trainers should consider how technology assistance can enhance the learning experience, reduce cost, save time in preparation or delivery, and reinforce what was learned in training back on the job. Trainers should be creative at the start of the design by brainstorming on alternatives to traditional approaches. For example, having sessions that cover basic concepts before classroom training will allow learners time to digest those concepts before the classroom training. There are commonplace computer applications that allow all members of a group to view the trainer's computer screen for demonstration and class presentation. The sessions can also be recorded and viewed at any time and in almost any place. These technologies can be used by anyone with high-speed Internet access and a Web browser—virtually every work computer and many home computers.

Examples of three such computer applications are

- Microsoft NetMeeting. This program comes standard with Microsoft 2000 or XP.
- Webex. Visit the Web at http://webex.com for more information.
- GlobalCrossing. Visit the Web at http://globalcrossing.com.

Other common technologies such as e-mail or FTP sites can also be used to send starter manuals and other training materials to participants to review before training is delivered or as follow-up materials after training delivery to enhance transfer of learning from training to job.

Identifying or Preparing an Assessment Instrument. The evaluation of learners and instruction should be considered during the design step. There are typically two types of evaluation: formative and summative. Instructional objectives provide guidance for each type of evaluation.

Formative evaluation targets the improvement of instruction. These evaluations are often one-on-one or small-group training sessions centered around small sections of the training material. Often delivered as pilot sessions before training is delivered to a broader audience, they gauge learner reactions, gather reviews from subject matter experts, and test training results on a limited basis before large-scale rollout.

Many instructional strategies that rely on technology assistance can benefit from formative evaluation. Access to the training can be initially limited to only a few. After the training, participants can be polled for feedback. The training can then be improved before access to the training is opened to large groups.

Summative evaluation considers the overall worth of a training intervention. For example, tests for industry certification programs are summative evaluations. Learner reactions and perceived long-term benefits are factors that are often taken into account in summative evaluations. Today's technology allows summative evaluation to take place in many situations that are independent of time or location. Web-base certification programs are a prime example.

Use Worksheet 1.1 as a job aid to think about meeting the requirements for effective training before beginning a technology-assisted training project.

Worksheet 1.1. The ISD Model.

Directions: Use this worksheet to structure your thinking about meeting the requirements for effective training before you begin a technology-assisted training project. For each question appearing in the left column below, indicate whether you have addressed the issue by checking the appropriate box in the center column. Then, finally, make notes in the far right column. If necessary, use this worksheet to plan for answering the questions.

Did you, the trainer, address each question below?	Yes	No	Not Applicable	Notes
Analysis				
1. Could people perform this work or task if their lives depended on it?	☐	☐	☐	
2. Have people performed the work or task successfully before?	☐	☐	☐	
3. Who (exactly) is targeted to receive the training?	☐	☐	☐	
4. What is involved in carrying out the work?	☐	☐	☐	
5. How well must learners perform upon completion of training, and how is successful performance measured?	☐	☐	☐	
6. Under what working conditions will the learners perform the task or work when they return to their jobs?	☐	☐	☐	
Design				
7. What should participants do upon completion of the training?	☐	☐	☐	
8. How will learners' ability to perform be measured upon training completion?	☐	☐	☐	
9. What equipment, tools or other resources do participants need to demonstrate their knowledge, skill, or attitudes?	☐	☐	☐	
10. What instructional materials or events should be used to meet the training needs?	☐	☐	☐	

(Continued)

Worksheet 1.1. The ISD Model, *Continued*.

Did you, the trainer, address each question below?	Yes	No	Not Applicable	Notes
Development				
11. What training materials may be purchased from others, such as commercial publishers or training vendors, to meet training needs?	☐	☐	☐	
12. What training materials must be prepared to meet the unique needs of learners in the organization?	☐	☐	☐	
13. What training materials can be purchased from external sources and modified to meet the learners' unique needs in the organization?	☐	☐	☐	
14. What medium or combination of media will strike a balance between being effective with learners and cost-effective for the organization?	☐	☐	☐	
15. What training methods are most effective with learners that receive the training?	☐	☐	☐	
16. How can participation and interest be captured and sustained throughout the training experience?	☐	☐	☐	
Evaluation				
17. How much do the learners like the training?	☐	☐	☐	
18. How much did people learn from the training?	☐	☐	☐	
19. How much did people apply what they learned in training back on their jobs?	☐	☐	☐	
20. How much did the organization gain in enhanced revenue or decreased costs as a direct result of training?	☐	☐	☐	

CHAPTER SUMMARY

Knowing technology does not mean knowing how to do training. To use technology-assisted training effectively, trainers must have some awareness of how to use technology and how to prepare effective training. This chapter described a systematic approach to preparing effective training. It addressed such questions as

- How should effective training be designed using an approach called instructional systems design?
- Why is the so-called ADDIE model of instructional systems design an appropriate starting point for training?
- What are the steps in the ADDIE model, and how should trainers use them?
- What special attention should be devoted to the first steps in the ADDIE model—that is, analysis and design?

Chapter Two focuses on the framework of technology-assisted training. It provides three useful ways to think about how technology may assist trainers.