

## 2. E-LEARNING DESIGN

### 2.0 Introduction

Instructional design requires selecting, organizing and specifying the learning experiences necessary to teach somebody something. Good Instructional design is independent of the technology or personnel used to create those learning experiences. The term instructional design used in this unit is in its broad meaning, which includes pedagogy and andragogy (teaching adults).

At its best e-learning is as good as the best classroom learning. And its worst, it is as bad as the worst classroom. The difference is design. Creating effective e-learning requires both design and development. Design is decision. Development is doing. Design governs what we do, development governs how we carry out those decisions. Design involves judgment, compromise, tradeoff and creativity. In this unit you would explore the aspects of Instructional Design for e-learning.

### 2.1 Learning Objectives:

The overall objective of this unit is

#### **To understand the design techniques in developing e-learning system**

The specific objectives are

- Define E-learning design
- Explain the aspects of Instructional Design
- Describe all the units of E-learning Design
- Discuss the Instructional Systems Design with ADDIE Model
- Explore the other models of ISD

### 2.2 What is E-Learning design

In e-learning the responsibility to provoke effective learning experiences may be divided. Successful e-learning design is the result of four main influences, each contributing concerns and capabilities. Producing effective e-learning is a large job requiring several different skills: instructional design, software engineering, and economics.

#### **Consider multiple perspectives**

- **Instructional design** contributes theories about how human beings learn, strategies for applying these theories, and methodologies to carry out the strategies. The knowledge of how human beings learn can guide selection and specification of new kinds of learning experiences such as simulations, learning games, online meetings and discussion forums.

- **Software engineering** helps us build reliable computer programs. Like it or not, e-learning is software. It runs on a computer, just as a spreadsheet or word processor does. It has a user interface and may draw content from a distant database. It transmits media over networks. It thus requires the same careful design and quality control as other forms of software. Software engineering contributes the concepts of object design, usability design and rapid prototyping.
- **Media design** helps us to use digital media well. When the only media were the words on a chalkboard and the instructor's voice we did not need to "design" media. Today we must select the appropriate mixture of text, graphics, voice, music, sound effects, animation and video. We must then sequence these various media and synchronize complementary media.
- **Economics** helps e-learning, deliver value. E-learning costs money. It may generate revenue. It takes time, people and other resources to create, offer and maintain. It must be developed under a budget and on schedule.

The day when one person can comfortably perform all these necessary activities is still a way off. Until then, the joint role of e-learning designer must encompass several disciplines. Why? These disciplines are performed by different specialists and teams, especially in complex projects. The goals of one discipline may conflict with those of another. Business goals may call for a sedate, conservative appearance, while the media designer wants to showcase video and animation.

Many people trained in one discipline lack experience in the others. Instructional designers educated over ten years ago may know little about how to select dynamic electronic media. Even recent graduates lack extensive training in animation design or game theory. Some aspects of e-learning production may be out-sourced, along with the detail design for that area.

True designers – and project leaders – will balance all these concerns and be knowledgeable enough to resolve conflicts, make compromises and spark innovation.

## 2.3 What is Instructional design?

Instructional Design is a process by which instruction is improved through the analysis of learning needs and systematic development of learning materials. It is a systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction.

It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. It includes development of instructional materials and activities and evaluation of all instruction and learner activities. Thus, Instructional Design is the process of anglicizing the learning needs and goals and the development of a delivery system to meet those needs. Instructional designers often use technology and multimedia as tools to enhance instruction.

Instructional design translates the high-level project goals to choices for technology, content and everything else. The instructional design of e-learning informs decisions on what authoring tools, management systems, and the technologies to buy or license. Instructional design directs the development of content and the selection of media. It orchestrates decisions on budget, schedule, and other aspects of project development. So, design your instruction- at least on paper – before buying any technology or recruiting new staff members.

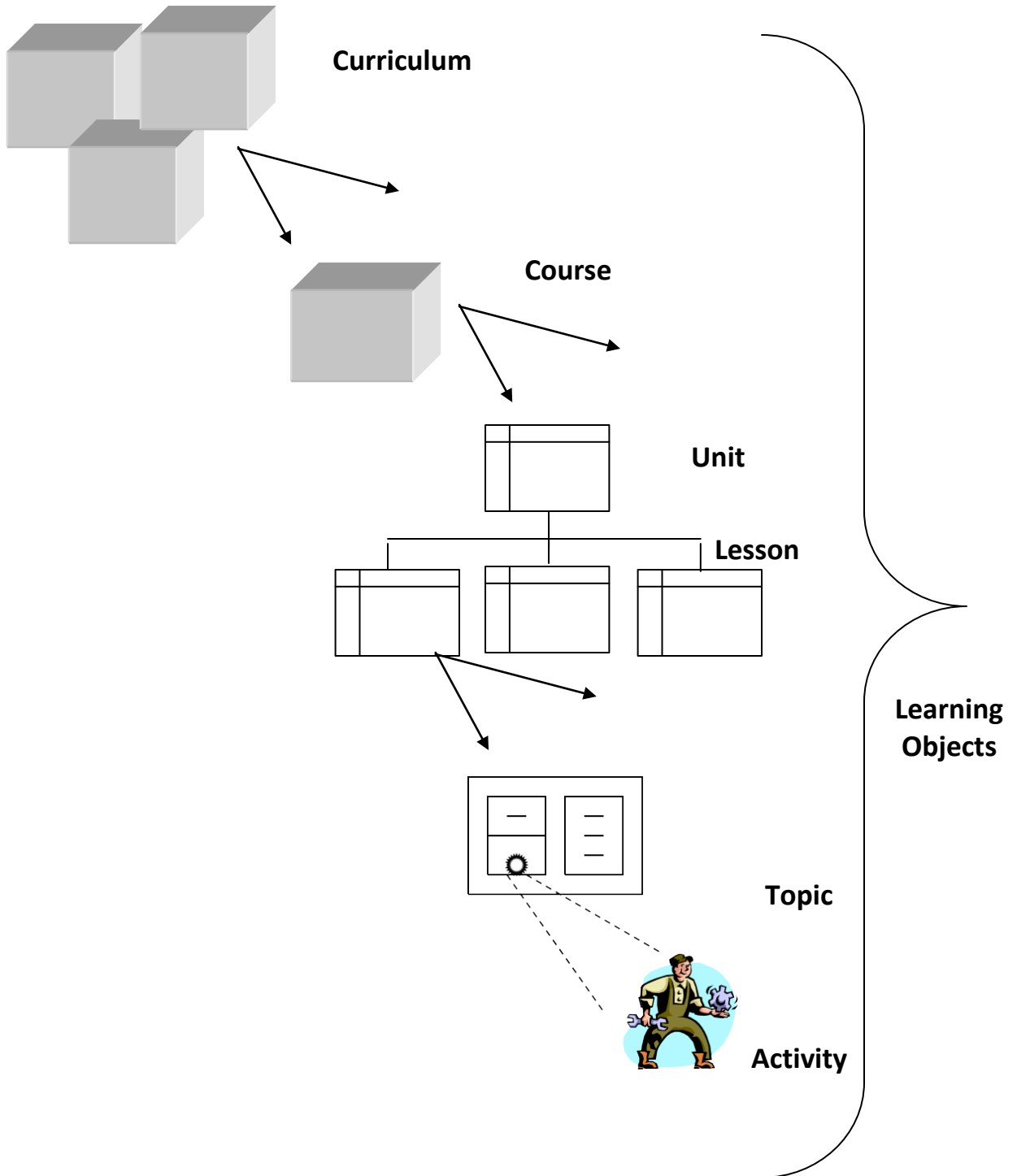
### **Design all units of e-learning**

Design must be applied at all levels of e-learning from whole curricula down to individual media components. It is important to understand these units because they influence what design techniques we use. At the top of the pyramid (Figure 5.1) are curricula, such as academic programs that include related courses that lead to a degree or certificate in a subject area. A curriculum could also refer to a library of courses on a certain subject.

Curricula are typically composed of courses, each of which teaches a broad but specific area of subject. We might also call such units as books or knowledge products.

Courses are composed of clusters of smaller components called lessons. Each lesson is organized to accomplish one of the broad objectives of the course or a cluster of related objectives.

At a lower level are the individual topics, each designed to accomplish a single low level- learning objective.



**Figure 2.1: Units of e-learning**

At the bottom level are learning activities; each designed to provoke a specific learning experience. Each activity may answer a specific question or make a point, but they are seldom sufficient to accomplish a learning objective by themselves.

The middle three units (course, lesson and topic) may all be designed as self-contained learning objects.

Let's see how to apply these levels in the real world. Here is a slice down through a single subject area;

**Curriculum:** Master's of Business Administration program

**Course:** "Accounting 101"

**Lesson** "Assets and Liabilities"

**Topic:** "Evaluating assets"

**Activity:** Using a spreadsheet to calculate the values of assets.

### **Design quickly and reliably**

The first step in quick instructional design is to clarify the goal of your project. This is a simple two-step procedure. First you nail down what matters to your organization – the one sponsoring development of learning. Is it profit or public service? Return on investment or reputation?

Next you describe how your project will contribute directly to that organizational goal. If you draw a blank at this point, cancel the project now before wasting resources. Once you do define how your project contributes, you have a solid basis to ask for funding and other support.

The next step is to write the learning objective for the course. This objective states how the learner is changed by the course. It describes the end result of taking the course. That objective, however, may have prerequisite objectives. And those second level objectives may have prerequisites as well. You keep identifying prerequisite objectives until you reach the starting abilities of intended learners.

A simple formula to state objectives: Teach blank to blank who blank. That is, teach a subject to a group of people who know certain things already. The first slot records what we intend to teach. It is usually skill, some knowledge, or an attitude. The second slot records who will learn the subject. It describes a group of learners. The third slot records what aspects of the subject the learners know or can do. Like the first slot, it records a skill, knowledge, or attitude. This last slot represents a prerequisite for the objective. It may point to another objective to satisfy that prerequisite.

Learning objective requires us to design a learning object to accomplish that objective, Our instructional design of the object requires us to design two types of content: Learning activities and tests.

Learners complete learning activities in order to learn. There are usually three types of activities required: the learner absorbs knowledge by reading or watching (Cognitive); the learner does practice or discovery activities to deepen learning (Psychomotor); and learners complete activities designed to connect what they are learning to their lives and work (Affective).

Tests are questions or other assessments to verify that learning occurred and the objective was accomplished

### **Identify your underlying goal**

Design starts with a goal. You may be designing an office building or a monumental sculpture. You may be designing a rocket or an automobile. You may be designing e-learning. Before you can design any of these things, you must know what it is your design must accomplish.

Rather than start listing the things you will accomplish for learners, however, think about what you will do for employer, your sponsor, or your financial backers. What does your organization hope to accomplish? Your list might look something like this:

- Reduce cost of education by 50% over the next year.
- Quickly prepare a global marketing plan to sell a new line of products.
- Cut misdiagnosis of battery failures by 90%
- Earn Rs.20,00,000 by selling courses.
- Recently 150 nuclear power plant operators.

Keep the organizational goal in mind as you make other decisions. Write this goal on a note card and tack it to your wall. Every day, ask yourself: “How am I helping achieve that goal?”

### **Ask what matters**

Your overall goal tells you what really matters. To clarify your goal, you need to answer two questions.

The first question is “what matters to your organization?” We might phrase the question this way: “For your company, University, department, government or institution, what is the single most important measure of success? Try to answer in three words or fewer. That restriction focuses your goal. Three words are plenty. You might say “bottom-line profit or return on investment. Or you might say “public service” or “unblemished reputation”.

The second question asks how your project will help accomplish that goal. How will the e-learning you design contribute to that goal? If you cannot convincingly and honestly argue that your project contributes to the goal, consider canceling the project now. Without such alignment with organizational goals, your project may run out of money, time and management support. Better to stop now before antagonizing the management of your organization by wasting organizational resources on an endeavor that does not matter to the organization.

### **Make your organization’s goal your goal**

Create a bridge connecting a high priority goal of your organization and the learning objectives of your e-learning so both business managers and instructional designers see the value of e-learning to the organization. Notice how this statement provides just such a bridge:

Most misdiagnoses of battery problems are caused by lack of knowledge among customer support technicians about the models of battery failure and the symptoms they can produce. By training customer support technicians, we can reduce the rate of misdiagnosis by at least 90%.

### **Consider a wide range of goals**

Organizational goals are not limited to profit or return-on-investment. Peruse your organization's annual report or replay speeches by your organization's leaders. Observe what your leaders emphasize as the values and goal of the organization.

You will understand in the next section the aspects of Instructional designing.

### **Applying Instructional Design**

Instructional Design is used wherever there is person trying to learn and another person trying to teach or instruct or facilitate the learning. Therefore, any effort to create any sort of instruction or learning material will involve some use of instructional design.

For example instructional design is used in:

- Education
- Instructor-led training (ILT)
- Distance learning
- Computer-based training (CBT)
- Web-based training (WBT)
- Multimedia
- Integrated Training Modes

## **2.4 Instructional Systems Design Model –ADDIE Model**

The Instructional Systems Design (ISD) concept has been around for at least 25 years. Conceivably, there are as many approaches to the process as there are practitioners of it. The basic model is simple to understand and easy to use in almost any training environment. Essentially, it is a series of steps leading to the production of a successful training program.

The ISD steps for building a course are analogous to steps for building a home. Building a quality home requires a systematic process so the home meets standards---personal, structural, and community standards among them. It could be disastrous if one left out a critical step, such as drawing up the blueprints.

The same ideas apply to developing quality training. Most ISD approaches contain five major phases (see Figure 5.2). The first four phases of ADDIE model are **A**nalysis, **D**esign, **D**evelopment and **I**mplementation are generally sequential; the outputs of one phase are the inputs to the next. The fifth phase, **E**valuation, involves feedback that applies throughout the model. This lesson looks at these phases and describes their purpose, relationships, and results

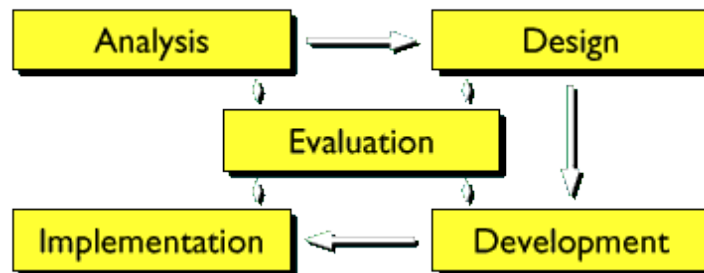


Figure 2.2: The phases of the Instructional Systems Design (ISD) model

## I. ANALYSIS

Analysis involves research, and the skills required to conduct a good instructional analysis are similar to those of any good investigation: thoroughness, objectivity, and a systematic approach. This phase determines training needs and expresses them as information useful for training development. The ISD model requires that training fulfill specific needs. This is done through the generation and evaluation of such analysis elements as needs assessment, job analysis, and target audience analysis.

### A. Needs assessment

A needs assessment is conducted when a job performance problem has been identified. Needs assessment involves a systematic identification of solutions to performance problems. The assessment determines the root cause of the problem, then proposes a solution. The problem may be due to inadequate training, poor job documentation, poor equipment, lack of motivation, or other organizational issues. Conducting training without repairing faulty equipment, for example, will not solve the problem; it will only exhaust resources. Needs assessment determines whether training, alone, will solve the problem.

### B. Job analysis

Job analysis is a systematic method of listing all the tasks necessary to competently do a specific job. These tasks represent the foundation on which we construct performance-based training objectives, course content, and evaluation instruments. Simply put, the job analysis provides a detailed "picture" of the job to be trained. The job analysis can also provide information about entry-level skills and possible prerequisites for training.



DOE Order 470.1A requires that all DOE "Safeguards and Security training shall be based on the results of job analyses." Job analysis is particularly critical for designing performance-based training.

### *C. Target audience analysis*

A target audience analysis identifies characteristics that affect trainee learning. The analysis includes information about trainees' educational background, previous training experiences, relevant work experiences, and motivation for training. This information helps designers customize training for the intended audience.

The analysis phase also identifies training requirements and training outcomes. Training requirements are the knowledge and skills that must be taught during training. Training outcomes are the tasks that trainees must demonstrate to ensure competent performance back on the job.

## **II. DESIGN**

The design phase is the planning stage of ISD. Its purpose is to transform relevant content into concise, behavioral objectives, creating the instructional "blueprint" that will direct the development of all training materials, tests, and methods. Training requirements and outcomes identified during analysis are written as goals and objectives. Then other design elements are addressed, such as instructional strategies, media selection, types of training materials, evaluation methods, and the design document.

### *A. Goal statements*

A goal statement is a broad general description of the learning outcome. It describes what the trainee will be able to do at the end of the training. Goal statements are written for the entire course, as well as for each lesson within it.

### *B. Instructional objectives*

An instructional objective specifies a measurable level of a behavior for a trainee after training, including the conditions and standards for the performance. Objectives are used to ensure achievement of the larger goal. Viewed as a unit, lesson objectives are the detailed steps leading to attainment of the lesson goal. Usually, several instructional objectives are written for each lesson goal.

### *C. Instructional strategies*

Since objectives form the framework for the training structure, the sequence of objectives is a very important part of lesson design. Objectives may be arranged in the order that tasks will be performed on the job, by their ease of performance, by order of the complexity of the task, or according to other appropriate strategies.

### *D. Evaluation methods*

Decisions on how trainees will be evaluated or tested are made in the design phase. Evaluation options include knowledge tests and performance tests. If a trainee learns by practicing a skill during training, the trainee must perform it when evaluated. He or she should not be evaluated with multiple-choice questions or by describing the skill in writing.

#### *E. Types of training materials*

Training materials include such items as texts, student guides, workbooks, instructor guides, job and training aids, visual aids, and case studies. While these items are produced in the development phase, they are identified in the design phase.

#### *F. Media selection*

Taking target audience characteristics, number of trainees, and environmental requirements into account, decisions are made about how to deliver the training to meet instructional objectives. One of these decisions is media selection, the course designers' choice of appropriate instructional media for a course. Media selection requires a close look at the strengths and weaknesses of each medium based on the type of student, what he or she needs to learn, and how to teach it.

Growth in electronic technology has substantially increased the media options for delivery of training. Today's media choices include video, computer-based training, interactive television, video-conferencing, written correspondence, and on-line training, along with the usual classroom or workshop options. Choices may change from goal to goal and lesson to lesson to get the best training results from the available media. Many electronic media now provide delivery of training or partial training without trainees ever entering a traditional classroom--we call this distance learning.

#### *G. Design Document*

The outcome of the design phase is an instructional "blueprint," a design document, that guides development, delivery, and evaluation of the training. Often a design document details design decisions that guide the training development team in production of course materials. In addition, the design document serves as a managerial review instrument in the approval process required at this stage of training development.

### **III. DEVELOPMENT**

The development phase translates design decisions into training materials. This is where the real work of course development is done. Using the objectives, instructional approach, and media selections from the design phase, development produces course materials for the trainer, course materials for the trainee, and evaluation instruments.

#### *A. Course materials for the trainer*

Lesson plans are the major element constructed during this phase. They function as a written "advance organizer" for the delivery of lessons by the instructor. Course materials include anything the instructor will need to present the lesson, including workbooks, handouts, visual aids, demonstration props, media equipment, and administrative materials.

#### *B. Course materials for the trainee*

Course materials for the trainee are materials that support and supplement lessons. These may include handouts that provide a summary of the presentation, replace or facilitate note taking, and provide references or job assistance back in the workplace.

#### *C. Evaluation instruments*

Testing and evaluating trainees' skills is a familiar part of learning and ISD. Often trainees are evaluated with cognitive or performance-based tests. Any form selected must test the trainees' mastery of lesson objectives. Written tests may include multiple-choice questions, and performance checklists may be used to record behavioral skills. The evaluation approach, form, and content identified in the design phase are produced in the development phase.

The development phase produces a standardized, documented approach to training delivery. This outcome assures that a trained, qualified instructor can deliver this training confident that training goals and objectives will be met.

### **IV. IMPLEMENTATION**

The implementation phase focuses on the details of training delivery. Logistical arrangements, such as scheduling a training place, preparing an agenda, setting up the training environment, and even practicing the presentation ensure delivery of a training session that captures trainee interest.

#### *A. Logistical arrangements*

Logistical arrangements are addressed in the implementation phase. These are time-sensitive planning and coordinating details such as scheduling training facilities, arranging for the set-up and use of equipment, accommodating guest speakers, etc. Another step is generating the training schedule. This schedule ensures that the trainer and trainees are informed of all events programmed to occur during training.

A good training environment is critical to good learning outcomes. Arranged well in advance, the training environment should fully support delivery of training. In a classroom or other on-site setting, comfortable yet functional furniture, work areas, equipment, safety plans, and training materials should be ready to meet the learning needs of each trainee, including those with special needs. When using a distance-learning medium, distant-site facilitators should prepare training environments at their sites. In the case of on-line training, site facilitators or training department staff must schedule trainees' access to computer terminals and server connections.

Training room heating and cooling, lighting, and trainee accesses to rest rooms, food facilities, smoking areas, telephones, and parking are additional considerations that require preplanning. Most administrative tasks should be completed well in advance of training: trainee registration, issuance of maps and directions, etc. Another aspect of preparing the training environment is arranging for facilitation of a social climate conducive to group formation and peer interaction. Placement of furniture, rules of conduct, and "ice breaker" activities are useful for creating a desirable social climate.

### *B. Delivery of training*

Delivery of the training is next in the implementation phase. The trainer must employ adult learning principles throughout the presentation. Using effective verbal and nonverbal techniques, the trainer must engage the trainees and demonstrate the appropriate skills necessary to achieve instructional objectives. He or she then must permit the trainees to practice their new skills, evaluate trainees' learning, and provide the trainees with feedback and an opportunity for remediation. The desired outcome of implementation is a roster of educated, skilled trainees.

## **V. EVALUATION**

The purpose of evaluation is to ensure that training-under-development stays on track, safeguarding achievement of training goals. Decisions about revisions for future course iterations can be made after evaluating the strengths and weaknesses in a completed training program. Finally, evaluation ensures that training improves performance back on the job. The ISD process includes two types of evaluation: formative and summative.

### *A. Formative evaluation*

Formative evaluation monitors the training as it proceeds through the ISD process. Monitoring involves periodically reviewing the analysis and design documents to confirm that objectives are being developed and delivered as originally intended.

### *B. Summative evaluation*

Summative evaluation is the process of reviewing a course or training after it is taught. It includes measurement of training outcomes in terms of trainees' opinions about the training, test results, on the job performance, and the benefit, or return on investment, of the training to the trainees' organization.

### *C. The feedback loop*

Dynamic feedback loops are very important parts of the ISD evaluation process. If the training under development does not satisfactorily proceed through a particular ISD phase, checking it against specifications from an earlier phase may identify the problem. If a problem is identified, the training product must be corrected in the deficiency phase. For example, if the implementation phase training does not teach actual job skills performed at the trainees' job sites,

the initial job analysis may be in need of revision. Back in the analysis phase, the training package must be corrected and re-developed from that point forward.

Training developed with the ISD model depends upon systematic movement through all five phases at least once or more than once, if revision is necessary. The evaluation phase tells us if training was successful, how successful it was, and where to correct the problems. Evaluation is the ISD phase that ties all other phases together through feedback. The outcome of one phase become input for the next. Feedback ensures that the transition of training through the phases stays on course.

### **Variations in the ADDIE Model**

Although the ADDIE model presents a logical flow of phases and steps, many organizations make slight adjustments to the flow to suit their individual styles. The steps in each phase of the ADDIE model are not always performed in sequence or even in the stated phase. Organizations use several variations of the ADDIE model. For example, in some organizations, Storyboarding is considered a part of Design, and in others, Writing Test Items is done during the Development phase.

In Table 2.1 different models of instructional design are summarized with their features.

**Table 2.1: Models of instructional design**

<b>Models of Instructional Design</b>	<b>Description</b>
<b>Gagne – Briggs</b>	<p>To design instruction:</p> <ul style="list-style-type: none"> <li>• Categorize learning outcomes</li> <li>• Organize instructional events for each kind of learning outcome</li> <li>• There are nine instructional events</li> <li>• Events are tailored to the kind of outcome to be achieved</li> <li>• Model is adapted to Web Based Instruction</li> </ul>
<b>David Merrill</b>	<ul style="list-style-type: none"> <li>• The model by David Merrill (Component Display Theory) is based on the following assumptions:</li> <li>• Different classes of learning outcomes require different procedures for teaching and assessment</li> <li>• Teaches individual concepts</li> <li>• Classifies objectives on two dimensions</li> <li>• Formats instruction to provide student directed teaching</li> </ul>
<b>Dick and Carey</b>	<p>This model:</p> <ul style="list-style-type: none"> <li>• Uses a systems approach for designing instruction</li> <li>• Identifies instructional goals in the beginning and ends up with summative evaluation</li> <li>• Is applicable for K-12 to business to government</li> </ul>
<b>Hannafin and Peck</b>	<p>The Model has three phases:</p> <ul style="list-style-type: none"> <li>• Need assessment is performed in the first phase</li> <li>• Second is the design phase</li> <li>• Instruction is developed and implemented in the last phase</li> <li>• All the phases involve a process of evaluation and revision</li> </ul>
<b>Gerlach and Ely</b>	<p>The Model</p> <ul style="list-style-type: none"> <li>• Includes strategies for selecting and including media within instruction</li> <li>• Is suited to higher education</li> </ul>

All these models are suitable for the design of instruction of course units (in print, multimedia and online) and have the following components in common:

- Identify and analyze the instructional objectives,
- Plan and design solutions to the instructional objectives,
- Implement the solutions, and
- Evaluate and revise objectives, strategies, etc.

## 2.5 Summary

The advantages of e-learning are not automatic nor are the disadvantages inevitable. Good Design makes all the differences. Designing e-learning requires more than traditional instructional design. Designers must incorporate ideas from software engineering, select and continue new digital media and work under tight economic constraints.

- Start with clear goals and objectives as you do not waste time and effort or just bores or distracts learners. Systematically identify the prerequisites for each learning objective you must accomplish and decide how learners will achieve each prerequisite.
- Specify the learning objectives to accomplish each objective. Determine what knowledge the learner must absorb, what the learner must do with the knowledge and how the learner will connect the knowledge to work and life. Invest in good tests.
- Tests will (1) tell you how well your design is working; (2) help learners monitor their own progress. (3) show what content learners skip and what content you can omit and (4) make your objectives crystal clear.
- Build your e-learning using interactive cycles of analysis, design, building and evaluating. Start with big picture and proceed to low-level details.

### References:

1. Margaret Driscoll, Saul Carliner,(2005) “ Advanced Web Based Training Strategies – Unlocking Instructionally sound Online Learning”, Wiley Pfeiffer.
2. William Horton (2006), “E-learning by Design”, Wiley Pfeiffer.

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