

## The Domain of Instructional Design

In simple terms, instructional design is the process of asking questions to determine an appropriate solution for an instructional problem. During instructional design process, an instructional designer conducts careful performance, contextual, job and goal analyses. Following these analyses, he makes decisions regarding what, where and how instruction is to be delivered.

According to Glaser (1976), instructional design is the core of instructional technology. It “is the process of specifying the conditions for learning” (Seels & Richey, 1994, 30). The process of design includes both the process of analysis of the needs and conditions for learning as well as the actual design of instruction. “Conditions for learning” refers to the specifications required to describe how learning will occur including the design of the delivery system, messages and strategies that will be included in the instruction. The purpose of instructional design is to make decisions at both the macro and micro levels. Macro-instructional design involves curricula and programs while micro-instructional design includes lessons and modules (Seels and Richey, 1994). Thus, work in this domain involves using a series of well-defined steps and processes to making design decisions that are informed by research and practice.

Instructional design process often begins with the analysis phase. In other words, analysis is embedded in the domain of design. During the analysis phase, an instructional designer often engages in both organizational analysis (macro level) and instructional analysis (micro level). As part of an organizational or macro-level, front-end analysis, instructional designer conducts performance analysis in order to define the performance problem, what is causing it and whether or not instruction is the best solution. Once it is determined that instruction is the best solution, the instructional designer uses instructional or micro-level analysis to identify needs, goals and tasks. The results of both macro and micro level analysis are then used to create strategies, products, lessons and modules (Seels and Richey 1994).

Included in the definition of this domain are the following subcomponents, which are briefly defined below and used in context as the process of design is described:

**Instructional Systems Design (ISD)** is “an organized procedure that includes the steps of analyzing, designing, developing, implementing and evaluating instruction” (Seels & Richey 1994 pp. 30-31).

**Message Design** involves “planning for the manipulation of the physical form of the message” (Grabowski, 1991, p 206).

**Instructional Strategies** are “specifications for selecting and sequencing events and activities within a lesson” (Seels & Richey 1994, p. 31).

**Learner Characteristics** are “those facets of the learner’s experiential background that impact the effectiveness of a learning process” (Seels & Richey 1994, p. 32).

### **Instructional Systems Design (ISD): A Systematic Process**

ISD is “based on the premise that learning should not occur in a haphazard manner, but should be developed in accordance with orderly processes and have outcomes that can be measured” (Seels and Glasgow, 1998, p. 7). The generic systematic approach most instructional systems designers use to conduct instructional systems design includes: Analyze, Design, Develop, Implement, and Evaluate (ADDIE). ADDIE proposes a cyclical model of ISD, the process not complete at the evaluation phase. Summative evaluation of one intervention, program or module should lead to identification of subsequent areas for improvement or provide insight into the solving future problems. ISD begins with

the analysis phase. The premise is that without solid analysis and appropriate design, instructional products are without foundation and, in most cases, ineffective.

In addition to ADDIE as a generic approach, instructional designers choose from a number of comprehensive and detailed ISD models. Among others, Dick, Carey & Carey (2005) and Seels and Glasgow (1998) models are the widely used ISD models. Both models follow the ADDIE process, although there are some differences between them. For example, while Dick, Carey & Carey (2005) offer a much more detailed prescription for front-end analysis, Seels and Glasgow (1998) take a broader approach in describing their model, leaving the designer with a number of procedural decisions based on the project. In addition, Dick, Carey & Carey (2005) do not address the implementation stage of the ADDIE process, whereas Seels and Glasgow (1998) attempt to touch on all phases in their model, offering processes for project management and implementation (Seels and Glasgow, 1998, Dick, Carey & Carey, 2005). However, despite these differences, both models offer instructional technologists a comprehensive approach to identifying and analyzing a problem, designing an appropriate solution, developing instructional materials, and designing formative and summative evaluations. Instructional systems design models are also known as procedural models. Procedural models are problem solving or systematic guidelines for solving instructional problems. These models assist instructional designers in conducting systematic or step-by-step approach to designing instruction.

To describe instructional design processes, instructional designers may formulate guiding questions to assist them in the processes of analysis and design. The following sections summarize these guiding questions and how instructional designers use these questions to analyze a performance problem and identify and design a learning solution.

#### **“What is the problem? How did we get here?”**

Determining and understanding the problem so completely that it can be solved is a challenging task (Rossett, 1987). In many cases, the problem and its causes are obvious; other times, often in complex systems, the problem is hidden, rooted beneath the layers of policy, procedure or social systems. Unearthing it requires careful analysis work prior to initiating the design of instruction (Dick, Carey, & Carey, 2005).

When encountering a complex performance problem at the organizational level, front-end analysis is, perhaps, the most important step in the ISD process. As Seels and Glasgow (1998) assert, instruction may not always be the best solution. Thus, it is essential to analyze the problem, to identify the need or problem and to ensure that instruction is the best solution. Once it is determined that instruction is the best solution, the approach to take when attempting to design instructional interventions is to first identify the needs or the gaps between “what is” and “what should be.” Needs will then be converted to goals or learning outcomes which in turn will later be used to conduct goal or task analysis, to determine what skills, knowledge, and attitudes are required to perform the tasks successfully (Seels & Glasgow 1998). The outcome of performance analysis is a clear description of the problem, a list of possible causes and solutions, and, in case of an instructional solution, a list of needs and goals.

#### **What must be learned? What are the goals and objectives?**

As a list of needs and goals has been developed, the instructional technologist must take those goals and begin the process of identifying what should be taught using the processes of task, learner, context and instructional analysis (Dick, Carey & Carey 2005). These processes will help the instructional designer to

formulate learning goals in order to determine what the learners will be able to do upon completion of the instructional program or module. In analyzing identified learning goals, the technologist should be careful to identify the primary domain under which it falls.

Domains of learning, as researched by both Robert Gagne (1962, 1965) and Benjamin Bloom (1956) are ways to classify the information to be learned. Bloom (1956) identified the cognitive, affective and psychomotor domains of learning, while Gagne (1985) identified verbal information, intellectual skills, cognitive strategies, attitudes and motor skills. Within each domain of learning, educators have developed taxonomies to assist the designer in determining “(a) the type of learning, (b) the sequence of instruction and (c) the scope of planning for instruction by grouping similar types of capabilities” (Seels & Glasgow, 1998, pp. 60-64). Through a careful goal and task analysis, performance objectives are written to identify specific skills to be performed in order to achieve learning goals. Performance objectives are derived from goals, which are too broad to provide evidence of learning (Seels & Glasgow 1998).

Performance objectives should address every unit of instruction and should be measurable. According to Mager (1975), performance objectives should: (1) describe the identified skill or behavior as an action using precise verbs, (2) describe the prevailing conditions when a learner carries out a task to help target specific learners, materials and abilities, and (3) describe the criteria that will be used to evaluate learner performance. As the performance objectives have been established, the technologist then turns his attention to determining what strategies will be used to determine whether learners are achieving the desired results.

### **How will we know if the objectives have been met?**

Designing assessment instruments before designing instruction is critical in determining instructional strategies. By designing assessments before instruction, the technologist is able to: (1) align one-to-one with performance objectives and (2) design the instructional strategy based on the nature of the assessment items (Dick, Carey & Carey 2005). In the K-12 public schools arena, this concept (termed “Backward Mapping” or “Backward Planning”) has become “the most innovative strategy in curriculum design” (Luongo-Orlando 2003). This is very interesting since Dick and Carey’s model of instructional design was originally developed in 1978 and included designing assessments before instructional strategies.

Assessment strategies can be used before, during and after an instructional program or module (Seels & Glasgow 1998). Assessment for learning (formative) assessment is used to guide instruction and learning, allowing course instructors and learners to know whether performance objectives are being attained or whether revision is needed. Assessment of learning (summative) is used to determine overall achievement of course goals and objectives and whether learning occurred. Assessment techniques tend to be distributed across a spectrum from objective (multiple choice, matching) to performance (portfolio, case study, etc.). The types of assessments used will help determine the instructional strategies used to ensure learners meet performance objectives.

### **What instructional strategies will be used? How will messages be designed to facilitate learning? What is the best delivery system?**

Instructional strategies are “an overall plan of activities to achieve an instructional goal” (Dick, Carey, & Carey 2005). The term instructional strategy is used to cover a variety of decisions including:

Selection of a delivery system  
Clustering of content  
Describing learning components of instruction  
Grouping of students  
Lesson structure  
Selection and design of instructional media (Dick, Carey & Carey 2005)

Each of the above components contributes to the overall design of a learning program or module. At this point, an instructional technologist should choose an instructional design theory that will describe in detail how learning will occur. Richard Mayer's SOI Model (1992), David Jonassen's Constructivist Learning Environment (1999) and Hanafin, Land and Oliver's Open Learning Environment (1999) (Reigeluth, 1983) offer specific strategies for actual message and delivery design.

Message design is planning for how information will be delivered to the learners – how the “instructional message” will be communicated. Messages can be in the form of still or moving images, static or dynamic text, audio or video. When designing messages, the technologist must be sure to specify both the medium and the learning task at both the macro and micro-levels of instruction (Seels and Richey, 1994). Richard Mayer, a leading researcher in message design, specifies the way in which messages should be designed in his SOI Model with the learner (1) selecting relevant information, (2) organizing the information into some usable format and, (3) integrating the new information into an advanced organizer (Reigeluth, 1983). As messages are designed, the technologist must keep in mind the design of a delivery system, media, or specific way that information is carried to the learner (Seels & Glasgow, 1998).

Delivery system options include print, audiovisual, computer-based or integrated technologies (Seels and Glasgow, 1998, p. 329). A detailed discussion of these delivery systems is located in the domain of development. Seels and Glasgow (1998) suggest that while channel requirements (instructional goals, objectives and assessment requirements), learning situation (contextual analysis) and constraints/resources (contextual analysis) are important to delivery system selection, learner characteristics play a much more critical role. An instructional technologist should first consider the psychological, physical or sociological facets of a learner's background before making a decision regarding delivery system (Dick, Carey & Carey 2005, Seels and Glasgow 1998).

### **What learner characteristics will affect the overall design of instruction?**

Seels and Glasgow (1998) suggest that “psychological characteristics [prerequisite skills, ability, motivation and learning style] will affect the difficulty and appeal of the material to the learner . . . physical characteristics [need for mobility] can influence the decision about which media will be most effective] . . . sociological characteristics [socio-economic background] may have a bearing on entry level skills” (p. 122). While the above statement focuses on the selection of the delivery method, Dick, Carey and Carey (2005) see learner characteristics as critical to the entire process of design.

Dick, Carey and Carey (2005) assert that information regarding entry behaviors and prior knowledge both affect objective formulation. They also suggest that learner characteristics such as attitude toward content and potential delivery system, academic motivation, ability levels, general learning preferences, attitudes toward training organization, and group interaction all greatly influence objective design and a variety of other design strategy components.

Dick, Carey and Carey (2005) suggest John Keller's ARCS Model for Psychological Motivation (1987) as a way of informing and motivating learners of the impending instruction, as well as ensuring their prerequisite skills. The model is intended to be included within the design of instruction, not as a separate model (Keller, 1987). Aspects of the ARCS model include: (A) gaining the **attention** of the learners through sensory stimuli, inquiry arousal and variability; (R) establishing **relevance** by answering the critical question, "What's in it for me?"; (C) raising **confidence** that objectives are achievable; and (S) increasing the level of **satisfaction** through some type of reward system (Keller, 1987). Newer models of motivation suggest that a new "breed" of student has emerged, the "Net generation" (Oblinger and Oblinger, 2005).

Oblinger and Oblinger (2005) suggest that in order to better educate the "Net generation," instructional designers must not assume that old models will continue to work. They also assert that the style of instructional delivery must also change. They assert that the new learners must be engaged in real-world problems, using relevant tools and resources for learning. Instructor control must relax and designers must begin to realize the value of learning by doing, focusing on the ethical and resourceful application of knowledge rather than simply imparting knowledge to students (Oblinger and Oblinger, 2005). Research in learner motivation suggests that the analysis of learner characteristics is in fact one of the most important characteristics that influence the design of instruction.

Researchers seem to agree that if an instructional technologist has not taken certain characteristics of the potential learners into account at all levels of the design process, sound instructional decision-making is at stake and the process of instructional design is flawed (Seels & Glasgow 1998, Dick, Carey & Carey 2005). The implication is that if the analysis and design are flawed, the product created by the ISD process will also be substandard.