

Designing Instructional Design: Emerging Issues

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Abstract

Instructional designers are expected to be familiar with the epistemological underpinnings of several theories and their consequences on the process of instruction. Constructivism is the dominant theory of the last decade and supports construction of knowledge by the individual. This paper discusses the basic principles, the major goal of any instructional model is to point up how to plan, develop, implement, evaluate, and organize full learning activities effectively so that it will ensure competent performance by students. underlying constructivism. Application of these principles on the process - analysis, development, evaluation - of instructional design poses certain challenges concerning issues such as pre-specification of knowledge, authentic evaluation and learner control. Most of the problems are attributed to the fact that constructivism is a learning theory and not an instructional-design theory. Therefore, instructional designers must attempt to translate constructivism into instructional design through a more pragmatic approach that focuses on the principles of moderate - rather than extreme - constructivism and makes use of emergent technology tools.

Keywords : Instructional design, Constructivism, Active learning, input, process, output, feedback, learning

Introduction

Instructional design (“ID”, also known as instructional systems design or “ISD”) is a tested and proven methodology for developing instruction. The field of instructional design is in a state of rapid change. Instructional designers are expected to be familiar with the epistemological underpinnings of instructional design and the consequences on the process of instruction. Therefore, designers must develop reflexive awareness of the theoretical basis underlying the design and must continuously assess and review instructional theories, tools and resources. As Mergel (1998) stresses, designers must understand the strengths and weaknesses of each learning theory to optimise their use in appropriate instructional design strategies. Since the field of instructional design is moving from the perspective of instructional design to human performance technology, one needs to understand all the factors influencing human performance, so that they could apply them properly to improve the performance. Therefore, one needs to know about the motivation to learn, motivation to work and self-motivation.

The roots of instructional theory can be traced to early efforts by educational psychologists to develop a connection between the science of psychology and the practical application of learning theory in educational settings. Two theorists of particular importance at the turn of the century were John Dewey (1910), who envisioned a special *linking science* between learning theory and educational practice, and Edward Thorndike (1913), who investigated principles of learning that could be directly applied to the teaching process (i.e., the laws of effect and exercise). Thorndike developed a body of instructional design principles that included task analysis and teaching methods based on his research findings and student evaluation methods.

Contemporary foundations of instructional theory may be rooted both in behaviorism and in the general trend of the 1950s toward applying scientific approaches to the social sciences. Attempts to integrate psychology and instructional technology had emerged during and after World War II as educational psychologists became involved with the U.S. military in efforts to research and develop military training materials and instruction. The focus of instructional research programs was twofold: first, development of

ISD (instructional systems design) methodologies for the analysis of content and tasks; and, second, testing of variables of design to achieve specific learning outcomes. At that time, the ISD approach to learning was related to theories of automation and the concept of systems as a complex interrelationship of components, flow and control of information, thorough analysis of a task, and careful planning and decision-making. Intrinsic to such instructional theories was the embrace of advanced technology and the "automation" of the learning process (Finn, 1957). ID is a discipline that is concerned with optimizing the process of instruction by prescribing methods and procedures to provide cost effective instructions. We can better understand by breaking the two terms in instructional design-‘instruction’ and ‘design’

Instruction is the deliberate arrangement of learning condition to promote the attainment of some intended goal” (Driscoll, 1994). Whereas design is a creative process.

Instruction is a plan of teaching & learning activities in which learning is organized. The instructional plan motivates students to learn. The aim of instruction is to make the learning process take place. According to Gustafson (1996), instructional design is:

1. analyzing what is to be taught/learned;
2. determining how it is to be taught/learned;
3. conducting tryout and revision; and
4. assessing whether learners do learn.

The name “ADDIE” is a common mnemonic (memory aid) for the five major steps in the instructional design process.

- A = Analysis
- D = Design
- D = Development
- I = Implementation
- E = Evaluation

Instruction is a systematic process in which every component (i.e. teachers, students, materials, and learning environment) is crucial to successfully learning (Dick & Carey, 1996). Instruction deals with teaching and learning activities. These activities should assist students to learn knowledge and move this knowledge from short-term memory to long-term memory. To do that, students need to learn how to rehearse, encode, process and feedback new knowledge to be able to remember when they need. In the instructional design process, there are many factors that should be taken into consideration. These factors are closely related to each other and affect each other to a certain extent. These factors should be organized in the instructional design steps. For example, if the goals and objectives are not chosen, specified or written properly, then the next and other steps will contain some problems because of the inappropriate and incomplete items in the previous step. In the instructional design, the steps are all interrelated with each other. It is very important to order the steps in a way that will be logical and in relation with other steps. In other words, instructional design is a big responsibility to design teaching and learning activities. The designer should be fully aware of the relationship among the steps. During the teaching and learning process, the designer should collect reliable data about the students, their backgrounds and their prerequisite learning. An instructional design model gives method and implication to design instruction. During the instructional design process, I.D. models help educators to visualize the problem. If the instructional design model solves the learning-teaching problems, it means that it is an effective instruction. Designing of the instructions can be done at four levels:

Level 1: Course level-Instructional planning is done at the highest level to specify main objectives of the course and detail out the specific lessons or units.

Level 2: Lesson level - where each lesson is planned to cover one or more objectives.

Level 3: Instructional event level- where enabling objectives are specified and detailed lesson plan for each objective is prepared covering appropriate media and methods.

Level 4: Learning step level – meaning each instructional event is planned in detail to write out some script or learning material. This is mostly the transactional level activity.

Effective instruction is instruction that enables students to acquire specified skills, knowledge, and attitudes (Reiser & Dick, 1996). During the effective instruction, students can be motivated well. To motivate students in the instruction process, all factors must be determined well. During determination process, there are four important principles that play key role. These principles are listed below:

1. Begin the planning process by clearly identifying the general goals and specific objectives students will be expected to attain;
2. Plan instructional activities that are intended to help students attain those objectives;
3. Develop assessment instruments that measure attainment of those objectives;
4. Revise instruction in light of student performance on each objective and student attitudes towards instructional activities (Reiser & Dick, 1996).

Teachers should follow these principles in order to apply successfully their instruction. The major goal of instructional design is to demonstrate planning, developing, evaluating, and managing the instructional process. At the end of this process, it can be seen the student learning performance in instructional activities based upon defined goals and objectives. Instructional design pays attention to instruction from the learner perspective than from the content perspective, which is traditional approach. According to Kemp, Morrison and Ross (1994), it involves many factors that influence learning outcomes, including such questions as these:

1. What level of readiness do individual students have for accomplishing the objectives?
2. What teaching and learning methods are most appropriate in terms of objectives and student characteristics?
3. What media or other resources are most suitable.
4. What support, beyond the teacher and the available resources, is needed for successful learning?
5. How is achievement of objectives determined?
6. What revisions are necessary if a tryout of the program does not match expectations?

These questions concerns with student learning because the major goal of instructional design is to accomplish the identified goals and objectives in the instructional activities. In the instructional design process, there are four key elements. These are:

1. whom to teach,
2. what to teach,
3. how to teach, and
4. how to evaluate.

In whom to teach process, knowing student personality is important because the target learners are students. Without students, instructional activities cannot be implemented. To design effective instruction, teachers should get information about student characteristics.

In what to teach, instructional goals and objectives are important. Teachers first must make decision on their goals and objectives in instructional design. Instructional goals and objectives give teacher information on what to teach during instructional activities.

In how to teach, teacher gets information on how to deliver goals and objectives to students in the instruction. Instructional delivery methods indicate teacher what kinds of teaching and learning methods will be used.

In how to evaluate, assessment tools are playing key role because teacher can get information on whether students accomplished the goals and objectives or not with the tools. During the educational measurement and evaluation process, teacher must use assessing tools such as multiple choice, short-answer items, true-false items, matching items, essay questions, problem solving questions and others to determine student-learning activities in the instruction. These assessing tools should have reliability and validity characteristics to determine learning outcomes.

These four elements are usually used to create an instructional design model. There are four kinds of instructional models (Gustafson, 1996). These are classroom model, product model, instructional systems models, and trends and issues. The classroom models such as Gerlack & Ely, Kemp, Heinich, and Reiser & Dick are designed teacher oriented based. Teachers can use this model to design instruction. The product models such as Bergman & Moore and Van Patten are interested in more producing instructional products either for specific clients or for commercial marketing. Instructional system model such as Branson, Seels & Glasgow, Bridggs,

Gagne, Smith & Ragan, Gentry and Dick Carey are designed for a complete college course. This model always requires a team effort to design instruction. There are some trends and issues in instructional design models. Hypermedia or internet is one of them. It affects instructional design. It is another area generating considerable excitement and innovation in the design of education and training environments (Gustafson, 1996). The other one is constructivism. It has also affected instruction process. It has gained considerable attention from educators dissatisfied with behaviorism and cognitive psychology. It is based on the belief that all individuals construct their own reality (Gustafson, 1996).

INSTRUCTIONAL DESIGN MODEL

The major goal of this model is to point up how to plan, develop, implement, evaluate, and organize full learning activities effectively so that it will ensure competent performance by students. The theoretical foundation of the model comes from behaviorism, cognitivism and constructivism views. Behaviorism as a theory of learning takes in to consideration on the relationship between stimulus & response, the reinforcement factor and designing environmental conditions. Those are used to motivate students to learn more in this model.

The behaviorist view of instructional design has five factors. These steps are analysis, design, development, implementation, and evaluation. In the analysis steps, instructional designer identifies input information (goals, objectives, the characteristic of teachers, the characteristic of students, materials, and others). In the design step, instructional designer designs teaching and learning activities. In the development step, instructional designer develops instructional materials and teaching-learning methods. In the implementation step, teacher implements teaching and learning activities. In the last step, instructional designer checks learning outputs. This instructional design model uses analysis, design, development, implementation, and evaluation factors to design learning and teaching activities.

Cognitivism is interested in motivation, intellectual learning process (short-term memory, retrieve and long-term memory), experiences and contents. This new model is interested in how to store the information into long-term memory. To store the information into long-term memory, instructional activities are designed in the model.

The cognitivist view of instructional design is construct new knowledge with own experiences. Learner should learn how to think and how to learn to solve their learning problems. The role of instructor is to design meaningful experiences in learning environments. Designed meaningful experiences should

motivate students to construct new knowledge in their long-term memory. The role of students is to join discussions and collaboration activities.

This instructional design model is effective in constructing new knowledge, designing meaningful learning experiences, motivation and organizing

Constructivism is interested in personal applications. According to McGriff (2001), the learning process must be concerned with the experiences and contexts that make the student willing and enable to learn. This is one of the things that model uses in instructional activities. Students become active participants, reflect their own thought and become autonomous. During the instructional activities, students try to get their own experience things. Their personal experience motivates students to involve in the process actively. By the help of experience, they will relate their own personal meanings to the learned information and it might be easier to keep in mind, because it will be much more meaningful.

The constructivist view of instructional design is learning by doing. In other words, active learning is the hearth of constructivists' instructional design process. For this reason, constructivists are interested in active process during learning activities. Learners should be active and use cognitive activity to construct new knowledge. During cognitive activity, learning environment is playing a key role to construct new knowledge. Learning environment must represent real life activities. In this environment, what is learned and how it is learned should be design together because how it is learned depends on what is learned.

Herrington and Oliver (2000) have identified nine elements to design constructivist instructional design. These are:

1. Provide authentic contexts that reflect the way the knowledge will be used in real life.
2. Provide authentic activities.
3. Provide access to expert performances and the modeling of processes.
4. Provide multiple roles and perspectives.
5. Support collaborative construction of knowledge.
6. Promote reflection to enable abstraction to be formed.
7. Promote articulation to enable tacit knowledge to be made explicit.
8. Provide coaching and scaffolding by the teacher at critical times.
9. Provide for authentic assessment for learning with the tasks.

The constructivist instructional design model is based on active learning. During teaching and learning activities, learner is active and uses cognitive learning to construct new knowledge. To construct new knowledge, educational technology materials are used. These materials are related with goals and objectives. New model is described a five-step systematic planning process. These are:

1. input,
2. process,
3. output,
4. feedback,
5. learning.

This process can be used to plan a variety of instructional approaches, ranging from teacher lectures to hands-on student -centered activities. In addition, because of using this process, teachers should be able to develop effective instruction. This effective instruction can help students to learn more and keep the new knowledge into long term memory. These students will be motivated to join class activities.

The first step in model is to clarify input. The input step is the foundation of instructional activities for learning and teaching. The designer also identifies learner characteristics. This is a key step in the instructional planning because it gives teacher information about the effectiveness of the instruction. In other words, these steps can help instructor to identify what to teach and how to teach instructional activities. The input step has five stages. These are:

1. identify needs,
2. identify contents,

3. identify Goals-Objectives,
4. identify teaching methods,
5. identify instructional media.

The first is to identify needs. It is an important factor in the total design process. Instructional designer uses survey, observation and interview methods to determine what the students need to learn. The definition of needs may be derived from a needs assessment with regard to particular curriculum. The second stage is to identify contents. The contents are derived from students' needs. The main goal of this step is to clarify what to teach. The third stage is to identify goals and objectives. The identification of goals and objectives is an important stage in the new instructional design model. The main idea of identify goals and objectives is to define what

students will be able to do after instructional process. The outcomes are usually clarified as behavioral objectives, learning objectives, or performance objectives. There are five categories of learning outcomes. These are intellectual skills, cognitive strategies, verbal information, motor skills and attitudes. Goals and objectives usually contain skills, knowledge and attitudes. Skills could be psychomotor skills and intellectual skills. When students learn psychomotor skills, they develop muscular actions. When students learn intellectual skills, they develop cognitive activity such as discrimination, implementation and solving problem. The goals and objectives are derived from need assesment and contents. The fourth stage is to identify teaching methods.

After the needs, content and goals have been identified, teaching methods are determined. Teaching methods should be related with content and goals because goals and objectives will be taught with the appropriate method. The last stage is to identify instructional media. It is a delivery method in instructional design process. In other words, it tells us how to deliver the instruction to students. There are two groups of instructional media. These are classical instructional media and modern instructional media. The classical instructional media includes books, journals, graph, model, picture, poster, cartoon, newspaper, dioramas, trip, blackboard and others. Modern instructional media includes multimedia, films, radio, telephone, television, computer, data projection, internet and others. Instructional designer usually uses the instructional media to enhance learning. The main goal of media is to apply communication and learning. Identify instructional media is based upon a review of needs, contents, goals and teaching methods. These instructional media should motivate students to learn and keep the new knowledge in the long-term memory.

The second step in model is to process: The process step has three stages. These are test prototypes, redesigning of instruction and teaching activities. The first is to test prototypes. In this step, teacher will be ready to try out the planned instruction with the students. The main goal of first stage is to find out which stages are working and which stages are not working. In other words, the problems in instructional design are identified during testing prototypes. Testing prototypes tells instructor what students really want to learn and how to get there. The second stage is to redesigning of instruction. After problems are identified, instructional designer reorganizes instructional activities. To reorganize instructional activities, pre-testing plays a key role to design an effective instruction. If an effective instruction is designed well, instructional goals will be achieved successfully. The last stage is to teaching activities. Teacher begins teaching activities in terms of content, teaching methods, goals and objectives with instructional media.

The third step in model is output: The output step contains two stages. These are assessment and revising instruction. In the first stage, teacher assesses teaching and learning activities in the instructional design model. Instructional designer uses formative and summative evaluation methods to check goals and objectives. This process requires teacher to implement assessment tools to determine whether the students did demonstrate the skills, knowledge, and attitudes that teacher described in instruction goals and objectives or not. When the students participate in the instructional activities, teachers want to know whether they learned what the instructional plan expected them to learn. To determine student learning, educational measurement and evaluation process should be implemented by teachers. This process gives teachers results on what students learn from the instruction. Teachers should analyze the results and make decision on where to go in the instruction. In the last stage, instructional designer evaluate all instructional

activities. Instructional designer finds problems during the instructional design process. Then, instructional designer solve the problems then redesign the instruction.

The fourth step in the model is the feedback: The feedback step has one stage. This is “Go back to related step”. The feedback process involves revise instruction based upon the data collected during the implementation phase. If, during the phase, teacher finds that students are not learning what the plan wanted them to learn, and/or they are not enjoying the learning process, teacher will want to go back to related step and try to revise some aspect of their instruction to better enable their students to accomplish their goals. If there is a problem in input step, instructional designer will go back to input step. Then, instructional designer will make changes and start process from input. This process will be done until all goals and objectives are learned by learners. During this cycle, instructional designer may go back to any steps to where a problem is occurred.

The fifth and final step in the model is learning. The learning step has one stage. This is “Long Term Learning”. The learning process involves full learning. In this process, teacher wants to make sure that their students have learned what the instructional plan wanted them to learn. If, during the phase, teacher finds that their students accomplished their goals in the instructional activities, teacher will want to go new instructional activities. At the end of this step, long-term learning is accomplished by instructional designer.

Summary

The main goal of new model is to organize long term and full learning activities. The new instructional design model is based on the theoretical foundation of behaviorism, cognitivism and constructivism. During teaching and learning activities, learner is active and uses cognitive, constructivist or behaviorist learning to construct new knowledge. To construct new knowledge, educational technology materials are used. These materials are related with goals and objectives.

This model is based on instructional system theory. It is occurred within the five stages. These are input, process, output, feedback and learning.

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