

Learning Theory and Instructional Design

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Introduction

Designing effective instruction goes beyond systematically executing various steps within an instructional design model. Among a host of considerations, effective instructional design should take into consideration the theoretical bases in which it is grounded. This is not to say that learning theory offers instructional designers answers to design problems but instead, offers clarity, direction and focus throughout the instructional design process. Merrill (2001, p. 294) explains that a “theoretical tool, in and of itself, is not an instructional design theory but defines instructional components that can be used to define instructional prescriptions more precisely.” Likewise, Merriam and Caffarella (1999, p. 250) make the point that “[learning] theories do not give us solutions, but they do direct our attention to those variables that are crucial in finding solutions.” Thus, understanding theoretical frameworks and properly incorporating them within the scope of instructional design is important for designers to effectively prepare and present instruction as well as for organizational entities to more precisely and efficiently address training-appropriate issues.

Three learning theories, specifically behaviorism, cognitivism, and constructivism, are addressed within the scope of instructional design. This article contains an interpretation of the learning process of each theory along with the implications each has on the instructional design process. It also examines the opportunities and challenges each theory presents to designers. This synthesis concludes with philosophical thoughts and suggestions for appropriate use.

Behaviorism

Addressing instructional needs from a theoretical perspective of behaviorism proposes a stimulus – response approach to designing instruction for learners. Behaviorism is an orientation to learning emphasizing

methodically time-controlled events and constructed environmental conditions intended to bring about particular behavioral responses. Merriam and Caffarella (1999, p. 251) identify three assumptions all behaviorists such as Mager, Skinner, Thorndike, and Watson share about the learning process:

First, observable behavior rather than internal thought processes is the focus of study; in particular, learning is manifested by a change in behavior. Second, the environment shapes behavior; what one learns is determined by the elements in the environment, not by the individual learner. And third, the principles of contiguity (how close in time two events must be for a bond to be formed) and reinforcement (any means of increasing likelihood that an event will be repeated) are central to explaining the learning process.

The first of these assumptions implies that behavioral-related instructional tasks have little regard for the cognitive processing of the learner involved in the task. This approach focuses entirely upon learners understanding the “what” through methods like rote memorization, identification, and association. This theory is concerned with illuminating only what learners need to know.

The second assumption of behaviorists says that learning is strictly influenced by environmental factors. This view is shown clearly through the early work of Robert Gagne, who was heavily influenced by behaviorists such as Skinner and Thorndike. Gagne’s early research examined positive and negative training transfer. “[Gagne’s)] research was done with training subjects on complex motor tasks using multiple trials and observing them for periods of little or no improvement in learning” (Fields, 1996, p. 225).

The last assumption of learning presented based on behaviorism stresses repetition and reinforcement (operant conditioning) in order to develop desired habits. B.F. Skinner was a major contributor to operant conditioning focusing on “positive and negative reinforcement schedules, the timing of reinforcements, and avoidance behavior.” (Merriam and Caffarella, 1999, p. 252).

Implications of Behaviorism on Instructional Design

One of the key areas where behaviorism impacts instructional design is in the development of instructional objectives. Morrison, Ross and Kemp (2001, p. 91) define an instructional objective written from a behavioral perspective as “a precise statement that answers the question, ‘What behavior can the learner demonstrate to indicate that he or she has mastered the knowledge or skills specified in the instruction?’” Writing “precise” instructional objectives can be challenging but offers instructional designers clear, measurable goals to which to guide their instructional design. Mager (1984, p. 21) determined that performance, conditions, and criterion are the elements of instructional objectives. From a behavioral viewpoint, the conditions element of writing instructional objectives can represent the stimulus/environment and the performance element can represent the response while the criterion element is considered the acceptable level of behavior expected.

In all, an implication of behaviorism on instructional design is built upon the concept that learning is based on mastering a set of behaviors that are predictable and therefore reliable. Thorough instructional and learner analyses and precise instruction will lead to desirable and demonstrable skills.

Strengths and Weaknesses of Behaviorism

The strength of instructional design grounded in behaviorism is that when there are specific goals to be met, the learner is focused clearly upon achieving those goals whenever there are cues to prompt the learner’s behavior. Kuchinke (1999, p. 51) succinctly states, “The strength of this framework lies in its ability to find quick responses to well-defined problems.”

However, since behaviorism is stimulus – response based, instructional design is dependent on the workplace or classroom having and maintaining the appropriate stimuli to continue the intended behavior. Thus, if a certain incentive is not present or does not occur, then the expected and desired performance may not take place. As an example, a

factory worker who has been conditioned to react to certain signals on an assembly line may stop performing when something out of the ordinary happens. Additionally, learning is a reactionary process to an environmental condition and knowledge is considered finite. Thus, behavior theory-based instructional design is heavily instructor dependent with high demands on resources in order to adapt to changes and needs, which can be costly and time-consuming. Through behavioral conditioning research, Skinner realized there is a burden on the instructor to maintain reinforcement. “Behavior that is not reinforced is likely to become less frequent and may even disappear” (Merriam and Caffarella, 1999, p. 252).

Cognitivism

Whereas behaviorists consider that learning involves responses to stimuli from the environment, cognitivists contend that learning is much more than this. Cognitivism carries the notion that “[l]earning involves the reorganization of experiences in order to make sense of stimuli from the environment. Sometimes this sense comes through flashes of insight” (Merriam and Caffarella, 1999, p. 254). Thus, a cognitivist views the learning process as an internal and active mental process, which develops within a learner, increased mental capacity and skills in order to learn better.

One assumption of cognitivism is that an existing knowledge structure must be present in order to compare and process new information for learning. This existing knowledge structure is referred to as schema. Schema is activated and utilized for the benefit of learning when a learner is “made aware of his background knowledge and exposed to strategies to ‘bridge’ from pre-requisite skills to learning objectives” (Blanton, 1998, p. 172).

Implications of Cognitivism on Instructional Design

Implications of cognitivism on the design of instruction are prominent throughout the task analysis and learner analysis phases of instructional design models. Cognitivists believe learners develop learning through

receiving, storing and retrieving information. With this notion, it is imperative for instructional designers to thoroughly analyze and consider the appropriate tasks needed in order for learners to effectively and efficiently process the information received. Likewise, designers must consider the relevant learner characteristics that will promote or impede the cognitive processing of information. Blanton (1998, p. 173) further elaborates that the implications of cognitive learning theory on instructional design should bear in mind that “the [instructional] goals should include learner needs and interest, reflect the concerns of society, and make every effort to insure that goals are focused at least toward the present and, hopefully, toward the future needs of the learner.”

Unlike behaviorism, which is environment-focused, cognitivism directs instructional designers to consider the learner as the focus of the design process. This does not inhibit the design of instruction in any way but merely shifts the focus of the design. In fact, a cognitivism learning perspective facilitates instructional design since it is grounded upon an objective view of knowledge transfer.

Strengths and Weaknesses of Cognitivism

Learning is relevant. Cognitive-focused instruction has the potential to provide more meaningful learning to the learner with a longer impact. Merriam and Caffarella (1999, p. 254-255) conclude from the work of the cognitivist, Ausubel, that “learning is meaningful only when it can be related to concepts that already exist in a person’s cognitive structure. Rote learning (behaviorism-based), on the other hand, does not become linked to a person’s cognitive structure and hence is easily forgotten.”

Writing behavioral-based instructional objectives as stated earlier specify clear, measurable terms. However, Morrison, Ross and Kemp (2001, p. 96) point out that such an objective becomes “the end rather than the means for instruction.” They continue to point out that cognitive-focused instructional objectives overcome this problem by “first stating a general objective to communicate the intent.” Further, (p.97) “cognitive objectives are well suited for describing higher levels of learning.”

A major weakness of cognitivism lies in its strength. Whereas schemas help to make learning more meaningful, a learner is markedly at a disadvantage whenever relevant schemas or prerequisite knowledge do not exist. To account for this, a designer will need to ensure that the instruction is appropriate for all skill levels and experiences. Designing such instruction could be costly and time-consuming.

One additional weakness of cognitivism is similar to behaviorism in the belief that there are only finite, pre-determined goals. Having pre-determined goals may be in fact desirable for an organization since it offers clear direction and purpose but such a fixed set of expectations can limit the potential of the learning. Learners and instructors may become satisfied with obtaining minimum competencies or carry the attitude that “if it’s not broke, then don’t fix it!” when the learning experience could actually be designed better.

Constructivism

There are a number of perspectives found under the learning theory umbrella of constructivism. Each of these perspectives shares a common premise that individuals actively construct knowledge based on experience. Thus, knowledge cannot be simply passed on from learner to learner, but must be constructed individually by each learner. Boethel and Dimock (2000, p. 6-8) outline that constructivist-learning theory emphasizes six assumptions of constructivism:

- * Learning is an adaptive activity.
- * Learning is situated in the context where it occurs.
- * Knowledge is constructed by the learner.
- * Experience and prior understanding play a role in learning.
- * There is resistance to change.
- * Social interaction plays a role in learning.

Examples of constructivist learning are found in experiential learning, self-directed learning and reflective practice. These learning strategies explicitly show that the focus is squarely on the learner’s construction of knowledge within a social context.

Implications of Constructivism on Instructional Design.

Instructional design considerations within a framework of constructivism begin with taking into account the learner's prior knowledge, understandings, and interests. Boethel and Dimock (2000, p. 17) state, "Teachers must understand what learners bring to the learning situation and begin there in helping students build new knowledge." Therefore, like cognitivism, constructivism begins with a thorough learner analysis and determination of appropriate tasks to promote constructivist learning.

As opposed to an objective approach to learning, constructivism is more open-ended in expectation where the results and even the methods of learning themselves are not easily measured and may not be consistent with each learner. Thus, heavy attention must be paid to the context of the learning situation. Spector (2000, p.7) notes that when from the perspective of constructivism, "context must be taken into explicit consideration when planning instruction." Addressing types of context in which the learning takes place is necessary in the scope of constructivism because it not only addresses instructional context but also learner context. Within the context of the learner, attention must be paid to the "goals of the learner...the learner's perceived utility of the instruction... and the learner's perception of accountability (Morrison, Ross, and Kemp, 2001, p. 55-56). These address directly the fundamental assumptions of constructivism.

Strengths and Weaknesses of Constructivism

Rossner-Merrill, Parker, Mamchur and Chu's (1998, p. 286-287) analysis of the cognitive flexibility theory concludes several strengths of constructivism. Content can be presented from multiple perspectives using case studies, learners can develop and articulate new and individual representations of information, and active knowledge construction is promoted over passive transmission of information.

Since constructivism promotes individual learner interpretations and interests, this can pose an instructional problem. There could potential-

ly be problems in adequately evaluating learning. Learners may each have different experiences within the learning process but each have valid and sufficient learning take place. Boethel and Dimock (2000, p. 18) address the concern that “teachers cannot respond to the multitude of student interests due to lack of resources available in the classroom or the school.” Furthermore, from a control perspective, imagine the chaos and litigation that would arise if every attorney decided to interpret laws and practices in their own unique way with no recourse from the courts?

Conclusions

An understanding and incorporation of learning theory is needed when designing instruction because it adds focus and direction to the process. Instructional designers should address their goals and intentions of designing instruction in order to best incorporate learning theory within their programs. This requires considering the learner’s needs and characteristics, content and context, the strengths and weaknesses of the learning theory considering the scope of the instruction as well as the designer’s own intentions, preferences, and expectations.

Each theoretical perspective offers benefits to designers but the perspectives must be taken into context depending upon the situation, performance goal(s), and learners. And since the context in which the learning takes place can be dynamic and multi-dimensional, some combination of the three learning theories and perhaps others should be considered and incorporated into the instructional design process to provide optimal learning.

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