

Emerging Theories of Learning and Preservice Teachers

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Abstract

Preservice teachers need knowledge of learning theories, knowledge of the impact of these theories on the development of software, educational tools, and classroom practices. Existing and emerging learning theories, the relationship between technology and learning theories, and ways to help preservice teachers develop an educational philosophy are discussed.

Keywords: learning theories, educational philosophy, preservice teacher needs, technology

In many cases, preservice teachers have very little knowledge of educational philosophies. Many have not studied Behaviorism or Constructivism in depth, and few have been exposed to emerging learning theories: Cognitive, Social, and Radical Constructivism, Multiple Intelligences, and Situated Cognition.

As these new professionals enter their classrooms, they do so without a personal philosophy of education. Often, they have little knowledge of technology's impact on teaching and learning, and they have limited knowledge of the ways learning theories impact software development, classroom management, or technology integration. This lack of knowledge renders them unable to apply learning theories or technology in ways that promote learning, retention, and transfer. According to Wang (2002), preservice teachers are exposed to computers, but they are often unaware of the impact of teaching approaches on computer use. They instruct from a traditionally teacher-centered paradigm that does little to foster creativity, transfer, or cooperative learning.

This paper discusses established and emerging learning theories, the relationship between these theories and technology, and ways to help preservice teachers develop personal educational philosophies that guide their selection, implementation, and utilization of classroom technology.

Established and Emerging Learning Theories

Two of the most well established learning theories are Behaviorism and Constructivism. The emerging theories consist of variations of Constructivism, the theory of Multiple Intelligences, and Situated Cognition. The most established learning theory before Operant Conditioning was Classical Conditioning. A Russian Physiologist named Ivan Pavlov proposed Classical Conditioning; he believed behavior consisted of involuntary physical responses to external stimuli (Roblyer, 2003). The most commonly used illustration of this theory is that of a dog salivating each time a bell rang. The dog was conditioned to associate a ringing bell with

mealtime. The ringing bell was external stimuli and the dog's behavior, salivation, was the involuntary response to that stimuli.

Behaviorism

Pavlov's Theory heavily influenced thoughts about learning until B.F. Skinner proposed Operant Conditioning (foundation for Behaviorism). Skinner felt that human learners could exercise mental control over their behavior, and their responses to stimuli could be shaped by the type of reinforcement they received. Teachers, in Skinner's view, were to arrange the contingencies of reinforcement in ways that promoted and supported student learning (Roblyer, 2003). Skinner identified several situations that could shape learner behavior: punishment, positive, and negative reinforcement.

Punishment decreases the likelihood of undesirable behavior, because it results in an undesirable consequence. An example might involve giving a student a failing score when s/he commits plagiarism. Positive reinforcement affirms the learner and increases the likelihood of a desired behavior; often praise, rewards, and encouragement are used in order to get learners to perform the desired behavior (i.e., study harder, pay attention, respond in class, etc...). Negative reinforcement also increases desired learner behavior, but this occurs when a stimulus is avoided or removed. Usually, something a student dislikes (losing a privilege, going to detention, going to the principal's office) is removed or avoided when the student performs the desired behavior.

During Skinner's time, it was not possible to directly observe brain activity and study internal processes inherent in learning, so he focused on observable cause-and-effect relationships that shaped human behavior. Behaviorism, also known as stimulus and response conditioning, relies on teacher directed approaches, student receptiveness, curriculum sequencing from prerequisite to advanced skills, mastery, systematic instructional design, and objective testing to assess competence. Contributors to the area of Behaviorism include Edward Thorndike, Richard Atkinson, Robert Gagne', David Ausubel, Leslie Briggs, David Merrill, and others.

Constructivism

Another established learning theory, Constructivism, is rooted in philosophy and psychology. In Constructivism, learners are active participants in teaching and learning contexts; they create knowledge based on their experiences and instructional relevance. According to Doolittle and Camp (1999), four tenets of Constructivism exist:

- “1. Knowledge is not passively accumulated, but rather, is the result of active cognizing by the individual;
2. Cognition is an adaptive process that functions to make an individual's behavior more viable given a particular environment;
3. Cognition organizes and makes sense of one's experience, and is not a process to render an accurate representation of reality; and
4. Knowing has roots both in biological/neurological construction, and in social, cultural, and language-based interactions (Dewey, 1916/1980; Garrison, 1997; Larochelle, Bednarz, & Garrison, 1998; Gergen, 1995; Maturana & Varela, 1992).”

Constructivists view learning as the development of insights. Knowledge is constructed in the mind of an active learner who is interactive rather than reactive (Rieber, 1991).

Constructivists Teachers see themselves as facilitators. Students work collaboratively to explore, discover, and gain competence. The learning environment encourages the development of higher-and-lower level competencies through hands-on projects that are assessed authentically. Contributors to Constructivism include John Dewey, Jerome Bruner, Lev Vygotsky, Jean Piaget, Howard Gardner, and others.

Some of the emerging learning theories are Cognitive, Social, and Radical Constructivism, The Theory of Multiple Intelligences, and Situated Cognition. These theories focus on individual and shared meaning, the strengths associated with learner diversity, and knowledge acquisition through ordinary problems.

Cognitive, Social, and Radical Constructivism

Cognitive Constructivism is based on information processing and the ability to reconstruct external reality (Doolittle & Camp, 1999). Learning is viewed as an accurate internalization of external representations found in the “real world.” Knowledge construction is highly technical and relies on the learner’s ability to create appropriate and accurate mental structures. Aspects of Cognitive Constructivism have contributed beneficially to understanding learning and instruction and creating useful instructional aids: concept maps, problem solving strategies, advanced organizers, and reading strategies. An example would be that of a student learning a problem solving strategy and using it to accurately solve a given problem.

Social Constructivism, according to Hung (2001), defines learning as a social or collaborative process framed in terms of cultural perceptions. The acquisition of knowledge is not an exclusively individual process, but an interactive exchange which results in shared meaning. Scaffolds are used to allow learners to bridge the gap between current and future knowledge. Based on Vygotsky’s theories, Social Constructivism emphasizes the significance of peer-to-peer interaction in the construction of knowledge. Classroom interactions enter around shared and negotiated meaning. Students gain a personal understanding of concepts, procedures, and processes. They are evaluated on their ability to collaborate and generate workable (rather than correct) problem solutions.

In Radical Constructivism, knowledge is internal to the learner. Its acquisition is adaptive and experiential. Knowledge varies from learner to learner, and it is not based on a “universal truth” or accurate replication of external phenomenon. Evaluations are based on internally coherent understandings that are well defined and viable to the learner. Correct representations that match a textbook or teacher’s solution are not encouraged.

The Theory of Multiple Intelligences

Howard Gardner’s Theory of multiple intelligences is an extension of Constructivist thought. Gardner attempts to define the role of intelligence in learning; his work is based on that of Guilford and Sternberg (Roblyer, 2003). Eight different types of intelligence are postulated: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, intrapersonal, interpersonal, and naturalist. Student learning relies on activities and authentic assessments that capitalize on these innate abilities.

Situated Cognition

Hansen (2002) indicates that Situated Cognition is a theory of learning that relies on realistic problem solving scenarios. Students participate in contextually relevant learning environments where they discover and apply new information, solve problems, gain access to expert perspectives, participate, and practice. Elements of Situated Cognition include authentic content, activities, and assessment; observations of multiple roles and perspectives; collaborative knowledge construction; reflection, articulation, and scaffolding.

Technology and Learning Theories

Behaviorism emphasizes memorization and repetition in teacher-centered environments. The curriculum is structured hierarchically to allow students to gain prerequisite skills and advance to intermediate and advanced levels of knowledge. Predefined criteria and systematically constructed learning promote mastery. Technology is used to remedy identified weaknesses, promote fluency, and support practice through tutorials, drill and practice software, online worksheets, and other forms of computer-based learning (Hung, 2001; Roblyer, 2003).

Constructivism allows students to build rather than receive knowledge. Based on collaboration and cooperation, Constructivist Learning focuses on real problems, creative solutions, transfer, and problem solving. Teachers function as guides or facilitators that assist students as they generate solutions and explore in complex and rich environments. The curriculum focuses on higher-and-lower level skills; performance measures include checklists, rubrics, and portfolios. Technology (simulations, applications software, multimedia, constructive and informative software tools) is used to facilitate metacognitive skills, emphasize transfer, create group projects and presentations, highlight the contributions and talents of diverse learners, and explore the relationships between data.

Cognitive, Social, and Radical Constructivism, Multiple Intelligences, and Situated Cognition rely on individual and group thoughts, perceptions, and actions. Problems are solved through individual and shared meaning. Learners use technology (hypertext and hypermedia, bulletin boards, chats, computer-supported intentional learning environments, and computer mediated environments) to gather information, conduct research, communicate, decompose problems, share documents, and participate in open-ended learning.

Helping Preservice Teachers Build a Personal Educational Philosophy

Learning theories are extremely important; they frame the learner's classroom experience, guide the teacher in establishing classroom interactions, technology applications, and classroom activities. They affect learning outcomes, classroom management practices, and the role of the teacher. As such, preservice teachers should be given the opportunity to experiment with technology following the tenets of these theories. They should be encouraged to develop a personal philosophy of teaching, learning, and the impact of technology based on their preferred learning theory or a combination of theories, student needs, and curriculum proficiencies needed at local, state, and national levels.

One way to help preservice teachers build their own educational philosophy includes altering the preservice teacher curriculum to include a mandatory course in educational foundations and technology integration. Topics to be covered could include learning theories,

using technology (applications software (spreadsheets, databases, word processing, desktop publishing), support tools (research and reference materials, data collection and analysis software), materials generators (worksheets, puzzles, forms, certificates), and conceptualization tools (concept maps, lesson planning software)), limitations of technology, structuring optimal learning environments, local and national proficiency standards, and other topics. Other ways to assist preservice teachers include the following:

- 1.) have students write an educational philosophy with prescribed components and make the connection between their philosophy and classroom practice through reflective journal experiences (Roberson, 2004),
- 2.) require students to interview master teachers and observe their classroom practices,
- 3.) create opportunities for students to view, study, and discuss videos of classrooms where established and emerging learning theories are demonstrated,
- 4.) have students electronically communicate with established scholars who serve as mentors, and
- 5.) allow students to electronically search the WWW for existing educational philosophies that they critique, discuss, use for creative role playing.

Summary

Preservice teachers need knowledge of learning theories and ways to translate established and emerging theories into classroom practice. They need to have the opportunity to build individual educational philosophies that guide their selection, implementation, and utilization of classroom technology. This paper summarized several existing and emerging learning theories, the relationship between technology and learning theories, and ways to help preservice teachers develop an educational philosophy.

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