The Philosophies of Learning Behind Improving Access to Learning Resources

Teaching in a Digital Age

Technology has the potential to improve access to more up-to-date, quality learning resources, anytime and anywhere, for both teachers and students, including those with special circumstances and needs. Digital resources are updated more readily than textbooks, providing students and teachers with more current information, as well as a wider variety of resources than a traditional classroom can offer. The benefits of increasing access in these ways are supported by formal theories and philosophies of learning.

Let's start with the Behaviorist philosophy of learning. *Behaviorism* focuses on learning as changes in behaviors, as opposed to changes in mental structures (Schunk, 2012). According to this philosophy, teaching should emphasize ways to increase desired behaviors (Hunt, 1993). In Behaviorist traditions, this can occur in many ways. One example is *Connectionism* (often viewed as a sub-theory of Behaviorism), which stresses that learners form associations between sensory experiences and neural impulses often through trial and error practices (Hilgard, 1996). One principal of this theory is that learning should involve practice and rewards that increase desired behaviors. Educational technology applications are often built around this principle. That is, many applications serve to increase drill practice (for tasks such as simple math facts, spelling practice and foreign language learning, for example) and include performance-associated rewards. According to the Behaviorist philosophy, increased access to these types of learning opportunities will increase strengthen neural connections and increase learning.

Another tenant of Behaviorism is *operant conditioning*, which refers to training voluntary responses by the consequences they induce (Skinner, 1938). Educational technology and apps that provide incentives for desired behaviors such as those allowing players to earn coins or tokens for correct answers (perform 10 math problems correctly in 1 minute and earn 10 coins to use in game) are examples of operant conditioning. Again, we often see educational technology increasing students' access to learning tasks built around operant conditioning principles.

A different approach to learning is *Social Cognitive theory*. Social Cognitive theory is a formal theory of learning that asserts people learn from observing others in their social environments (Bandura, 1986, 2001). Social Cognitive theory proposes that more learning takes place when (1) students are able to see multiple models of task learning, (2) when self-efficacy is promoted, and, (3) when students have access to tutoring and mentoring (Schunk, 2012). Again, educational technology increases students' access to each these opportunities. Let's briefly take them in turn.

According to Social Cognitive theory, *modeling*, which refers to learners observing others perform actions in context, is central to learning (Rosenthal & Bandura, 1978). Teachers often incorporate modeling into their

own teaching practice. An example of this is when a teacher shows students step-by-step how he/she would solve a problem. Before technology, students' access to models was limited. Now, technology can increase teachers' ability to provide models, and increases students' access to models by providing opportunities for ALL students to observe teachers explain and demonstrate concepts and skills. Students are no longer bound by the resources of their particular instructor or even their particular school or community; Technology applications present students with access to instructors around the globe who have varied training, knowledge and approaches to modeling learning.

Another central theme in Social Cognitive Theory is that students' learning is increased when conditions promote self-efficacy. *Self-efficacy* refers to the belief in one's own ability to complete tasks and reach goals. Self-efficacy is increased when students are able to watch a model of a skill or task and then have a chance to practice it themselves (Schunk, 1981; Zimmerman & Ringle, 1981). Technology increases access to these opportunities to increase students' self-efficacy by providing students with experiences of modeling followed by practice. For example, a student could work collaboratively with another student(s) using Google Docs. That student could have the opportunity to watch another student performing a task, such as writing a paragraph or solving a problem, and then subsequently have an opportunity to perform the same task. Other software has these opportunities already built in to the product. For example, some educational software programs begin lessons with a recorded teacher, avatar or other character who models the desired skill or behavior, after which the student is provided an opportunity to perform the same skill or produce the same behavior. Many types of educational technology increase students' access to opportunities to increase their self-efficacy.

Lastly, Social Cognitive theory also stresses the importance of tutoring and mentoring for learning (Schunk, 1987). Technology provides access to tutors and mentors for students who may not have them otherwise. Students are no longer bound by the offerings of their school community. Instead, technologies allow students to connect with tutors and mentors from all over the world. This increased access to mentors and tutors allows students to learn from experts with whom they would not otherwise be able to reach.

Another influential formal learning theory is *Information Processing theory* (cf., Atkinson & Shiffrin, 1968, 1971). This theory focuses on students' abilities in the areas of (1) attention, (2) perception, (3) encoding of skills and information, (4) storage of knowledge in short and long-term memory, and, (5) retrieval of knowledge. Information Processing theory stresses that individual students have different information processing capacities. Put simply, students differ in how much information they can attend to, encode, retrieve, and retain in the short-term and in the long-term. According to Information Processing theory, students must be able to automatize some functions in order to free up cognitive resources to learn

effectively (cf., Mayer, 1996, Schunk, 2012). For example, automatizing simple math functions frees up cognitive resources for other types of labor intensive processing such as is required for text comprehension or self-regulation of behavior. Technology provides students with access to learning opportunities that strengthen their ability to automate skills and allows them to automate at their own pace and in ever-evolving ways. Applications that provide students with drills and practice follow this principle and provide students with access to increasingly changing and innovate ways to automate essential skills.

Although I have focused most of this article on the ways that technology increases access for all students to learning opportunities supported by learning theory, I would like to stress that technology also provides increased access to learning opportunities specific to special populations such as those with disabilities or special needs. For example, many computers are now preloaded with software that increases such access including voice commands, built-in braille support, audio books and keyboards that are "slow" or "sticky," which helps disabled students control the computer. Additionally, curriculum that is delivered via technology can be paced to the specific needs of each student, which is not an opportunity that most students would get on a daily basis in a regular classroom. Educational technology also allows students with disabilities the opportunity to connect with others just like themselves, increasing their access to mentors and increasing their self-efficacy.

The emergence of educational technology holds great promise for education. Technology increases and improves learning for all students because it provides teachers and students with access to up-to-date, relevant content, skills practice, real-world problem solving opportunities as well as experts, mentors and tutors. According to learning theories, this increased access will serve to improve teaching and increase learning.

Research & Innovation NETWORK

About the Teaching in a Digital Age Research

States and districts are investing heavily in educational technology, aiming for a transformational change in student learning. The crucial next step is to effectively integrate technology with instruction to improve learning outcomes. Pearson, Digital Promise, National Network of State Teachers of the Year (NNSTOY), and the University of San Diego have come together to research digital learning strategies and how they positively affect student learning. Separating tools from toys, this research strives to provide evidence-based recommendations for educators to implement in their classrooms.

Learn more at ResearchNetwork.Pearson.com

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