

## Principles of Learning through the Lenses of Present Day Teaching Machines



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As the old adage goes, "Back when I was in school? I was honored to have my early education at a small, private Catholic school whose class size afforded me more of a personalized educational experience than many others growing up. In beginning graduate school, I didn't have an email address or own my own computer or cell phone. My idea of education still included sticks of chalk, cleaning chalkboard erasers, red pens, and lugging books and many handouts for what seemed like miles to each class session. My idea of higher education also included personalized "face time" where students and instructors would meet in person for the required Carnegie hours. I would also stand in line with my peers at my professor's office hours where we would toil over questions and concepts which needed refining outside of class. Because I had an inquisitive mind, I was encouraged to go to the campus library and search through the card catalog, microfiche, and stacks of books or periodicals. Without the benefits of the wide spread use of computers, my idea of the world of higher education and acquiring knowledge was centered on a system of paper and print which required squinting at library stacks with placards and call numbers.

In thinking about my early educational experiences today, and my role as both an educator and psychologist, there have been countless advancements that have truly been beneficial to the field of education. My present day instruction methods include extensive use of an online learning management system and technological aids which are essential in promoting learning through the click of a mouse or swipe of a screen. In reminiscing further upon my on my roots as a psychologist, I recently reflected upon the historical contributions in which psychology has shaped the instructional methods of modern day education. In 1953, psychologist B.F. Skinner developed what was coined as the "teaching machine." This ground breaking machine was designed to offer programmed instruction to learners under the principles of operant conditioning and behavioral shaping (Skinner, 1961). It was a mechanical device in which the learner was able to view and respond to a list of novel questions. When the learner provided a correct answer, he/she would be rewarded and provided with immediate, regular reinforcement in an effort to move towards the desired behavior (Skinner, 1958). Also important to note, the teaching machine had the capacity to be adjusted based on the number of incorrect responses and then reprogrammed using methods of adaptive instruction. The rate of error also was minimized as the learner was provided with less rigorous versus advanced questions as part of the learning process until the basic concepts were mastered (Skinner, 1961, p. 381). While using the teaching machine, the learner was able to self-manage the process of thinking, attending to, and responding appropriately to stimuli (Skinner, 1961).

Well informed educators have easily drawn connections between the primitive teaching machine and modern day computer-based software and adaptive technology (Hudson, 2013). However it was not until recently that Carnegie Mellon University's Open Learning Initiative step into the limelight did the field of education fully commit to merging and putting these concepts in action (Rix, 2012). The Open Learning Initiative has provided 29 colleges and organization with \$10.6 million in grants to develop technology-based programs that utilize many of principles of the teaching machine and operant conditioning. Programs such as Knewton, developed by the non-profit company Next Generation Learning Challenges, allow learners the opportunity to enjoy a video game-like interface while mastering educational concepts (Fischman, 2011). Knewton, as well as others, were developed to assist remedial learners with tackling basic concepts while working their way up to mastery of the subject material under the guise of adaptive technology. So far, 12 subject areas ranging from statistics to French have been developed and used in a variety of academic institutions (Rix, 20-12).

The infrastructure of Knewton, as well as BioBook developed through Wake Forest University, engage students with animated

videos, interactive diagrams, personalized profiles, badges, and pop-up features to entice the learner through the process of developing skills and concepts (Hudson, 2013). Many programs also allow for engagement with interactive tutors who offer additional assistance. Publishers such as Pearson, Cambridge University Press, Houghton Mifflin Harcourt, and Macmillan have also created partnerships and incorporated Knewton's technology into their digital content resources (Hudson, 2013). These relationships are likely to create a win-win situation as personalized learning is a key player and on the forefront of education today. With the Department of Education reporting that approximately 57 percent of students in a bachelor's program completing their degree within six years, and approximately 22 percent completing an associate's degree within three years, these concerning graduation rates do warrant a continued change in the way we meet the evolving needs of today's learners (National Center for Education Statistics, 2009).

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