Chapter II
Designing Automated Learning for Effective Training and Skills Development

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ABSTRACT

This chapter explores automated e-learning for training in career and technical education (CTE). This addresses the foundational pedagogical theories, various applied technologies, the selection of learning contents to automate, various sequencing strategies, pedagogical agentry and intelligent tutoring agents, and human-centered mitigations to enhance this learning. Games and simulations are a special kind of popular automated training. Also, this chapter will cover various personalization strategies in automated learning to individualize and enhance the learning experience.

INTRODUCTION

Automated learning has played an important role in career and technical education for decades. Automation in e-learning has made possible consistency in training, in a performance-centric economy. It has broadened the portability of the learning and mitigated for spatial distance. In many cases, the need for travel for trainees has diminished. "Offloading the instructor" results in cost savings as well. The convenience of automated training means that training time is flexible and will fit more easily into busy lives. Automated trainings may be repeatable until mastery or comprehension. Many systems have also been designed for easy updatability of the learning contents, to future-proof the learning.

The learning may range from the static to the dynamic, the non-interactive to the fully interactive, and the pre-designed to the stochastic. Some automation requires passive observations, such as screencasts, screen captures, and some audio-visual multi-sensory experiences. Some automations require some responses at decision

junctures, such as multiple-choice and true-false decisions; others require data input, with single or multiple input paths. Full immersive games and simulations may have continuous decision-making and even social communications with other live learners.

In career and technical education (CTE), automated trainings are used for cognitive, affective, and psychomotor objectives. Business, service industries, medicine, therapeutic psychology, aeronautics, equipment use, engineering, and crisis management are popular fields for automated trainings. Many companies use simulations to eliminate bottlenecks in learning and employee trainings in various business processes (Ostermann, et al., 2004, pp. 240 – 245). Business simulations may result in "increased speed to market, reduced costs, and increased efficiency" (Adkins, 2003., n.p.; A comparison of simulation-based…, 2003).

For all the potential benefits of automated learning, there are some controversies. The loss of critical distance in the immersiveness of some games and simulations. Learners may get caught up in the stories told and the digitally mediated experiences and not actually learn (Frasca 2004: 87, as cited in Dovey & Kennedy, 2006, pp. 9 - 10). Another challenge is that developing automated learning requires forethought and planning, a wide knowledge base, complex technologies, and high cost investments.

This chapter will provide a brief history of automated learning. Then, the pedagogical theories underlying automated learning will be addressed. This will update the technologies used for learning automation. Various types of automated learning delivered online will be explored, including games, simulations, microworlds and sim life immersive spaces. The next section will address strategies for designing automated learning. Next, this will examine ways to enhance automated learning through the human touch and access to expertise. Hybridized automated learning will be explored next. Ways to assess learning through automation will be addressed, along with future trends and a conclusion.

BACKGROUND

What does automated learning involve? Often, automated learning is non-instructor-led but is instructor-designed. It often occurs in a "single learner mode" in one location, but more recent automated learning may involve co-learners connected by mediated technologies. It is replayable and iterative. In some ways, automated learning occurs as a form of computer-based training (CBT) or Web-based training (WBT), or with the learner interacting with the programmed computer. It also may occur with pre-programmed boxed trainings of CDs (compact discs) and DVDs (digital videodiscs) with programmed interactive contents. Some live human interaction may occur virtually through mediated means.

In immersive virtual learning environments (VLEs), automated learning may involve interactions between a live individual and the machine, or with multiple users interacting also with each other. Automated learning has come a long way from the days of drills where people could experience 10-key or word-processing. It has moved well beyond the rote memorization of flashcards and math formulas. Automated learning now may involve learner performance tracking, with resultant customizations of the learning experience. It engages a range of learning for tasks that may be high-risk or high-cost in reality, such as simulating power plant accidents; affording practices flying aircraft, and decision-making during critical incidences.

Automated sequences may be stand-alone experiences, or they may be part of a sequence of various types of learning activities. These may be integrated with face-to-face and online learning. Such trainings may be deployed through large networks that deliver the learning (via various modalities) and keep track of learner achievements.