Computer-Based Simulation in Blended Learning Curriculum for Hazardous Waste Site Worker Health and Safety Training

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ABSTRACT

Intended for the interest of individuals and organizations who provide adult/worker training and education, we present a discussion of a computer-based simulation training tool used as part of a hazardous waste site worker health and safety training curriculum. Our objective is to present the simulation’s development, implementation, and assessment for learning utility from both trainee and trainer perspectives. The simulation is blended with other curriculum components of training courses and supports small group learning. Assessment included end-of-course trainee questionnaires and trainer focus groups to addressing simulation utility as a user-oriented learning tool. A majority of trainees reported simulation trainings as useful learning tools with numerous advantages that support a participatory, blended learning curriculum, and raise awareness of potential work site risks and hazards. Trainers reported that the simulation advanced training impact. Evaluation results indicate that the simulation successfully supports small group learning activities.

Keywords: blended learning; computer-based training; instructional evaluation; technology-enhanced learning; worker health and safety training

INTRODUCTION

Over the last two decades, computer-based teaching technologies have been implemented for training workers about health and safety hazards on the job. Much has been accomplished in areas of software development, human-computer interface, and learning theory to improve adaptability of these technologies for teaching many kinds and levels of computer-based simu-
lation products designed to deliver education and training. Corporations, public education, and various branches of military service are using and have realized benefits of simulation training materials.

This article presents a discussion of the application and learning utility of a computer-based simulation developed and provided by The New England Consortium (TNEC) for small group activities in health and safety training for workers engaged in Hazardous Waste Operations and Emergency Response (HAZWOPER). Preliminary evaluation of this new format of simulation training was conducted to assess its utility and benefits from the point of view of both trainees and trainers. Evaluation methodologies included surveys of trainees, focus groups with trainers, and field observations of the developed simulation training. Although an experimental evaluation design was not used, the results are nonetheless informative for discussions of how computer simulation curriculum can be used for worker health education and training. We describe the development of the computer-based simulations that were incorporated into TNEC courses, and follow with a discussion of evaluation methods and results, and finally the implications of these findings.

The TNEC Program

Since 1988, TNEC has continually conducted worker health and safety education and training for workers engaged in hazardous waste operations and emergency response (HAZWOPER). Based at the University of Massachusetts Lowell, TNEC includes five worker health and safety advocacy organizations - Coalitions for Occupational Safety & Health, or COSH groups, in Connecticut, Massachusetts (Boston and Springfield), New Hampshire, and Rhode Island. TNEC is a National Institute for Environmental Health Sciences (NEHS) Worker Education and Training Program (WETP) awardee (one of nearly twenty nationally). The NEHS WETP supports and promotes model training programs targeted to address specific needs of workers with HAZWOPER duties in a wide range of processes and industrial sectors (NEHS WETP website: http://www.niehs.nih.gov/wetp/). The program provides its awardees funding to develop training using electronic training technologies intended to establish a high national bar for such HAZWOPER worker health and safety training.

TNEC’s curricula and courses are based on models rooted in Freirian theories, the British Trade Union Council, and the Highlander School (Luskin, Somers, Wooding, & Levenstein, 1992; Merrill, 1994, 1995; C. Slatin, 1999; C Slatin, 2001; Wallerstein & Baker, 1994; Wallerstein & Bernstein, 1988; 1992 pg. 8). These models present interactive approaches that facilitate a learning process wherein workers can reflect upon their existing knowledge and understanding, incorporate new information, and use the information to build worker power through local health and safety strategies.

In 2000, TNEC decided to apply electronic teaching media in blended learning approaches to its worker-oriented occupational health and safety (H&S) training. The intent was to design computer-based training modules that would support collaborative learning among trainees. TNEC’s computer-based simulation modules were developed with multiple goals. One was to create modules that could be used effectively to support participatory training as a tool within the small group activity method (SGAM). Another was to introduce students to situations too dangerous or complicated to include in hands-on training modules and extend their preparation for decision-making in actual field settings. Lastly, to use the computer simulation, in addition to other training methods used in the courses, to improve students’ preparation for a final hands-on hazardous waste site remediation or emergency response drill activity by extending their practice of collective health and safety protection strategy development.

SGAM, central to TNEC training courses, is a learner-centered teaching approach that provides trainees with opportunities to apply new and experiential knowledge in developing problem solutions, which are then discussed with a larger group. The larger group discus-
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