Evaluation of a Framework to Support Embedded Training Using Mixed Reality Simulations

In order to meet new readiness goals, military training is moving to be more soldier-centric, just-in-time, and embedded within the situations, equipment, and even the uniforms that soldiers use. At this same time, newly emergent technologies, such as virtual and mixed reality, offer opportunities to greatly enhance embedded training. These technologies often involve merging real and virtual worlds where real environments or objects are superimposed with virtual ones, or vice versa (Milgram, Takemura, Utsumi, & Kishino, 1994). These technologies offer unique opportunities to create powerful simulations that are contextualized to support a range of needs and contexts.

Yet there are few guidelines on how to design and deliver training in these contexts, or how to support learners' performance in these cognitively complex simulations. Hedberg (2002) states that with highly cognitive and complex environments, learners are often placed in the role of managing their own learning and resources. Without appropriate support, training may not be as effective.

To address these issues, cognitive and metacognitive supports (i.e., scaffolding) should designed and embedded within the simulation environment. To facilitate this goal, we have developed a Problem-Based Embedded Training Scaffolding Framework (PBET-SF). This scaffolding framework serves as an instructional support tool to be used by learners to reach specific goals by providing specific types of learning supports (e.g., job aids, hints) for developing soldiers' cognitive, metacognitive, and problem solving skills as well as other types of skills. It builds on prior developments in scaffolding (e.g., Hannafin, Land, & Oliver, 1999; Jackson, Krajcik & Soloway, 1998; Bell & Davis, 2000; Reiser, 2002) as well as expert/novice research (Bransford et al, 2000).

In this paper, we will describe the development and heuristic evaluation (Neilsen & Molich, 1990) of the PBET scaffolding framework. In summary, evaluation indicated that the PBET scaffolding framework, when implemented appropriately, would potentially be an effective way to support embedded training. Evaluators also agreed that the categories of scaffolding described in the PBET framework would help soldiers who are participating in complex, mission-based training environments as well as instructional designers who need to design supports into mixed reality simulations.

Overall, evaluators indicated that the PBET scaffolding framework would support complex, authentic interactions and participation in learning environments. This is critical considering the complexity of the OFW equipment and systems of the future.