Chapter 66
Incidental Learning in 3D Virtual Environments:
Relationships to Learning Style, Digital Literacy and Information Display

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ABSTRACT

With teachers taking more interest in utilizing 3D virtual environments for educational purposes, research is needed to understand how learners perceive and process information within virtual environments (Eschenbrenner, Nah, & Siau, 2008). In this study, the authors sought to determine if learning style or digital literacy predict incidental learning, that is, learning that occurs without learners being instructed to attend to or learn presented information. One hundred and fifty-five education undergraduate students completed a series of tasks in a virtual environment where additional information unrelated to the tasks was present. The results indicate that in addition to incidental learning taking place in virtual environments, learning style and digital literacy seem to predict incidental learning in some instances. The results also suggest that information display, in this case visual salience, plays a role in incidental learning as the participants performed better on recalling information that was made more salient.

INTRODUCTION

Virtual Learning environments (VLEs) are increasing in popularity in educational contexts (see Eschenbrenner, Nah, & Siau, 2008). According to New Media Consortium and EDUCASE Learning Initiative (2007), virtual environments are "richly immersive and highly scalable 3D environments" (p. 18). Users explore virtual environments using an avatar, which is a virtual representation of the user within the world. Dickey (2003) proposes that VLEs are "networked, desktop virtual reality in which users move and interact in simulated 3D spaces" (p. 105). Warburton (2009) suggests, "a

virtual environment provides an experience set within a technological environment that gives the user a strong sense of being there" (p. 415). Although sharing similarities with video games, a key difference between games and virtual environments is that a game is more limited to a particular contextual setting and goal, while a virtual environment can be created and modified for any situation, allowing for greater flexibility. Virtual environments can be created for almost any discipline because they are not as contextually based as games (New Media Consortium and EDUCASE Learning Initiative, 2007).

Virtual learning environments are visually complex spaces that include multiple forms of information as well as opportunities for interaction with others. Although immersive to some degree, we cannot assume that learning processes and interactions are comparable to those we observe in real-world learning spaces where learners are physically within the environment. In this study, we tested several elements of learning spaces that can impact learning to determine if these effects may exist in VLEs as well. First, we were interested in the impact on learning of the traits that individual learners bring to the VLE (e.g., learning styles and digital literacy). Second, given VLEs can be information rich environments, we were interested in what information learners may retain beyond their intention to learn or engage in instructed activities. The unconscious retention of information that has not been purposefully studied is referred to as unintentional or incidental learning. It has been posited that this kind of unconscious learning is relatively robust over time because it is resistant to interference from explicit memory processing (Frensch & Miner, 1994). Stadler (1997) suggested that information acquired incidentally may later be retrieved for explicit reporting or manipulation. Hence, it is possible that incidental learning might enhance overall learning without placing additional demands on cognitive resources. Finally, we were interested in the form and degree of the visual salience of information that is required to capture attention and result in increased incidental retention (images vs. text, plain vs. bolded text).

LITERATURE REVIEW

The literature review covers the definitions of four key elements of this study: 1) incidental learning, 2) learning styles, 3) digital literacy, and 4) information display: visual salience.

Incidental Learning

Incidental learning is a term that is both similar to, and a subset of, other terms in the learning literature. For example, Schugurensky (2000) considers incidental learning to be "learning experiences that occur when the learner did not have any previous intention of learning something out of that experience, but after the experience she or he becomes aware that some learning has taken place. Thus it is unintentional, but conscious" (p. 4). Incidental learning is a subcategory of, and can be considered a form of, informal learning. Marsick and Volpe (1999) define informal learning as the unstructured learning that takes place as people go about their daily lives; it typically occurs outside of formal institutions. As a simple explanation, Gass (1999) presents incidental learning as a "byproduct of other cognitive exercises…" (p. 319).

Simply, incidental learning is something that happens unintentionally while the learner is doing something else. This can have implications for education and student learning because, while learners are receiving explicit instruction, they could also be acquiring other information that exists within the learning context.

Learning Styles

The concept of learning styles has a history that spans nearly 50 years. The term "learning style" has multiple definitions in the literature. Pash-

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