Simulations, Games and Virtual Worlds

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Ruth Clark and Richard Mayer describe principles of design for simulations and games in Chapter 15 of *e-Learning and the Science of Instruction*. Khe Foon Hew and Wing Sum Cheung describe the research that has been conducted on the use of virtual worlds in education in their paper *Use of three-dimensional (3-D) immersive virtual worlds in K-12 and higher education settings: A review of the research*. Clark and Mayer should include a discussion of immersive virtual worlds when discussing simulations. Virtual worlds can be created to simulations that students can enter and interact, and game concepts can be incorporated by limiting access to areas until competency has been met in prior areas.

According to Clark and Mayer, the activities involved with the simulation or game "must align with the desired instructional outcomes (Clark & Mayer, 2008). Hew and Cheung cite several examples of research where virtual worlds have been used in education. Hew and Cheung classified these environments as experiential spaces. For example, a course on 3-D object modeling used a virtual world in which the 3-D models could be viewed from a first-person perspective (Hew & Cheung, 2010). I am not positive that this counts as a simulation though, because the parts of the virtual world that the students built were the actual objective of the course.

Clark and Mayer report that the features that motivate during game play (Clark & Mayer, 2008). All of these features are found in virtual worlds, especially the exploration and fantasy components. Hew and Cheung report that most research that has been performed has focused on the affective domain, that is, student attitudes toward learning. They report that students enjoyed using virtual worlds (Hew & Cheung, 2010). Clark and Mayer further point out that a "simulation or game will be successful to the extent that it does not overload working memory and at the same time promotes generative processing aligned with the instructional goal." (Clark & Mayer, 2008) Although virtual worlds are enjoyable, more research needs to be performed to determine whether the immersive nature of the world produces too large of a cognitive load for learning to be effective.

Both sets of authors agree that more research needs to be performed on this topic. They both indicate that success occurs when the learning environment matches the objectives of the course. They both agree that simulations and games motivate students. Most research on virtual worlds have been in the affective domain, and Clark and Mayer report that students are not the best judges of the way they learn best (Clark & Mayer, 2008).

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