Leveraging Game-Play in a 3D World: A Comparative Study in a Biology Classroom

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ABSTRACT

Computer games have the potential to engage students who do not respond well to traditional classroom activities. To test the appeal and usability of game-play in the classroom, four ninth grade science classes in a rural Upstate New York school were randomly assigned to learn an introductory genetics unit for three class periods in either an online, multi-user, virtual world computer environment or in a traditional classroom setting using lecture, worksheets and model building. The groups were then reversed for a second three-day trial. Quizzes were given before, at midpoint and at the end of the study. Both groups demonstrated significant knowledge gain of the genetics curriculum. This study demonstrates that self-directed learning can occur while exploring virtual world computer environments. The students were enthusiastic about using virtual worlds for education and indicated a strong preference for a variety of teaching methods, which suggests that offering mixed modalities may engage students who are otherwise uninterested in school. [Article copies are available for purchase from InfoSci-on-Demand.com]

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INTRODUCTION

Motivating students in subjects such as mathematics and science remains challenging. Minorities and girls seem especially vulnerable to this phenomenon. They begin to lose interest in these subjects as early as middle school and ultimately become
underrepresented in these career fields later in life (Clark, 1999). There appear to be very complex relationships among the motivational factors involved in this process. Dicintio and Gee (1999) found that at-risk students’ academic motivation was strongly related to amount of control over decisions and choices they felt they had within the learning environment. This perceived control related to a decrease in boredom, confusion, and desire to be doing something else.

Hidi and Harackiewicz (2000) suggest that engaging children in activities that interest them will naturally lead to goal-oriented behavior. They use the image of a child interested in baseball who practices swinging a bat thousands of times to perfect her swing to elucidate this point. The trick, they argue, is to engage children in a variety of activities, ideas, and materials and let them find whatever aspects of a topic interest them personally. This will lead to the development of the students’ personal mastery goals, which may be much more powerful motivators than any they receive from adults.

Deci, Vallerand, Pelletier, and Ryan (1991) review studies centered on the self-determination theory of motivation that provide evidence that classroom environments supportive of student autonomy (i.e., compared to those focused on controlling behavior) promote a higher level of intrinsic motivation, perceived competence, and self-esteem. “When intrinsically motivated, people engage in activities that interest them, and they do so freely, with a full sense of volition and without the necessity of material rewards or constraints” (p. 328) (see also Deci & Ryan [1985]).

Many adults have noted the intensity with which students play video games and wished these children would apply the same effort to their schoolwork. Educational researchers such as Gee (2005) offer suggestions for incorporating learning principles into video games in addition to content to maximize their educational potential. He states, “Challenge and learning are a large part of what makes good video games motivating and entertaining” (p. 34).

According to these authors, perceived control and interesting activities (such as video games) that also offer challenge are key factors to building self-motivated learning. It seems that numerous researchers have taken this advice to heart in the development of serious games for the classroom. Chris Dede’s River City Project at Harvard University uses multi-user virtual environments with middle school students to enhance their motivation to learn science. This program is offered as a supplement to conventional classroom activities (Dede, Clarke, Ketelhut, Nelson, & Bowman, 2005; Dede, Ketelhut, & Nelson, 2004; Dede, Ketelhut, & Ruess, 2003). In addition to being generally well received by the students, the researchers have found that the program also improves attendance and reduces disruptive behavior (Dede, Clarke, Ketelhut, Nelson, & Bowman, 2005).

SciCentr, an outreach program at Cornell University, uses online, multi-user virtual worlds primarily to engage middle and high school students in science, technology, engineering, and mathematics (Corbit & Norton, 2007; Corbit, Koledziej, & Bernstein, 2005; Corbit, 2005). SciCentr has worked with fifteen school districts to support a variety of projects, ranging from virtual field trips to interactive exhibits to programs through which students create their own worlds.

One creative program is a constructionist-based virtual science fair afterschool program, called Scifair, which began in
Gerontoludic Design: Extending the MDA Framework to Facilitate Meaningful Play for Older Adults
www.igi-global.com/article/gerontoludic-design/177271?camid=4v1a

Value of a Ludic Simulation in Training First Responders to Manage Blast Incidents
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