

Video Games and Mathematics Education: Studying Commercial Sports Video Games to Identify the Potential for Learning and Thinking About Mathematics

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Abstract

What happens when commercial sports video games, designed for entertainment, are used in an effort to increase achievement, confidence and enjoyment in mathematics for children? This exploratory study is an attempt to examine the potential for connecting digital media (sports video games) to learning various mathematics concepts.

Video Games and Mathematics Education

What happens when commercial sports video games, designed for entertainment, are used in an effort to increase achievement, confidence and enjoyment in mathematics for children? This exploratory study is an attempt to examine the potential for connecting digital media (sports video games) to learning various mathematics concepts. Video games are popular across generations, and have been so for several decades. The Entertainment Software Association (2006) reported that 31 percent of gamers are younger than 18 years old. Attempting to capitalize on these statistics, educators and game designers have created products that replicate many components of regular commercial video games (“Edutainment” games), yet have been unable to capture the same level of student engagement (Buckingham & Scanlon, 2003). Jonassen (1988) suggests digital media, such as computers and video games, were typically used in classrooms for factual recall. This was true of most Math/Logic video games such as “Math Maze” and “Math Blaster!” and they were usually considered “enrichment exercises” for students (Educational Math/Logic Games, n.d.). However, as a video game player myself, I have recognized commercial sports video games (not considered “Edutainment” games) that suggest mathematical practices during usage. By studying children playing these games, this project will demonstrate if and how children “mathematize” various situations while playing these sports video games. The use of entertainment driven commercial sports video games to foster mathematical comprehension is a creative method of capitalizing on popular youth culture in informal settings for insights into formal mathematics education.

Unfortunately there is scarce literature on examining people’s mathematical activity with commercial sports video games, designed for entertainment, to provide insights into mathematics instruction. The few studies reported on mathematics and video games focus more on the use of educational games as opposed to commercial sports video games (Klawe, 1998).

Cultural Knowledge as a Learning Lens

Studying variations of how children learn can be a significant contribution to improving educational practices. The question, “How do people learn information?” renders several responses and suggestions. Use of one’s prior knowledge and previous experiences has been the most common principle recently used to describe how children and adults acquire new information (Bridglall, 2001; Bransford, Brown, & Cocking, 2000). These learning theories suggest that each person will generate new information based on previous experiences (Richardson, 1997). Furthermore, a child’s learning is also affected by the experiences they receive as a result of their racial, ethnic, economic, and cultural identity (Lave, 1988; Saxe, 1990; Moll & Whitmore, 1993; Bridglall, 2001). Cultural practices in particular can help or hurt students in formal classroom settings by influencing how students comprehend information in schools (Greenfield, 1998).

Bransford, Brown and Cocking (2000), present an example that illustrates how knowledge situated in cultural contexts can negatively affect how a student interprets a problem: Today we're going to talk about cutting up a Thanksgiving holiday favorite—pumpkin pie. The teacher continues with an exploration of parts. Well into her discourse, a young African-American boy, looking puzzled, asks “What is pumpkin pie? (p.72; Tate, 1994).

The example continues stating how disconnected a child could be with a lesson, largely because of the cultural difference. Additionally, the example also suggests the boy's comprehension of the problem could have increased, if the teacher used a reference more familiar to the student.

This study seeks to focus on children's thinking, as well as utilizing their cultural experiences to improve educational practices in mathematics. Participants will be defined as students who believe video game play is commonplace in their cultural practice. Examining if and how these students utilize different mathematics concepts during video game play could provide information for future learning environments, and educational practice. From the lens of students' cultural knowledge, the intention of this study is to investigate how students learn to play video games and the possibility for mathematics learning through game play.

Participant Description and Research Questions

As a result of children's interest in video games and the amount of time spent playing them, this study will explore novice sports video game players and expert sports video game players and what possible mathematics they use while playing the games. Novice player is defined as a beginner/new to a particular video game, but not a novice to video game playing; only played the game less than 2 hours total, and not familiar with different special settings and effects of the game.

An expert player is defined as a specialist/knowledgeable player of a particular video game and an expert at video game playing more generally; having played the particular game for more than 20 hours total and comfortable with multiple special settings and effects of the game. J. deHaan (personal communication, October 10, 2006) claimed that most video game players master a game after playing it for about 20 hours or consistently for about a month, it depends on the player. In addition, participants' survey responses will help differentiate between students who are familiar with the actual sport emulated in the video game and those who are not. This identification could also help justify novice vs. expert players.

By following novice players as they increase their knowledge of sports video games and improve their abilities in the games, this study will attempt to answer the following questions:

What mathematics are students utilizing, explicitly or implicitly, while playing this genre of video games?

What mathematics is necessary for players to become experts in these video games?

Studying the answers to these questions may suggest ways to help students recognize the mathematics present in their video games and how they can use the information in another context or learning environment, specifically as a mathematics classroom.

Future Research Considerations

Continuing this research could lead to several future questions involving digital media in education. In particular, one question is: If students learn about how they use mathematics while playing commercial sports video games, can they transfer their understanding to improve similar mathematics comprehension in school? Studying the answer to this question and how children recall strategies learned while playing video games and apply the same strategy to another situation, which Salomon & Perkins (1989) refer as *high-road transfer*, could help support the

use of sports video games as a mathematical instructional tool and develop how digital media is used in the classroom.

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