Exergaming Theories: A Literature Review

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ABSTRACT

Until recently exergaming was seldom a topic of research. The technology that makes exergaming possible was not available to consumers. In 2006, Nintendo released the Wii gaming system. This new system allowed for interactive physical movement beyond simple hand held play. The Wii system contained hardware and software that responded to movements of the player’s body through the tracking of hand held controllers and movements of the lower extremities using floor based hardware. Exergaming appears poised to continue its foray into popular culture for better or worse. After nearly a decade of research a single theory for exergames has not been suggested. Previous researchers have relied on existing theories to guide them. Over a dozen theories have been used by authors of research into exergaming. With all of this research and the many theories that have been used it is time for an examination of these theories as to their relevance for exergaming. This paper endeavors to review the existing literature to identify what theories are being used in research and to delineate what the components of each theory are. A literature review was conducted using the Trident International University online library. This library allowed access to the ProQuest Summon® Service search engine which allowed for a search of multiple libraries including Blackwell, Gale, LexisNexis, Academic, Sage, Springer, Emerald, ProQuest, Taylor & Francis, IEEE, and Project Muse resulting in a search of more than 6,800 publishers and 94,000 journal and periodical titles. There are over a dozen theories found in the literature on exergaming. This paper endeavors to examine how often each theory appears in the literature while providing a brief overview of each theory. In the final analysis, the theory chosen for exergame research will be determined by the type of study undertaken.

Keywords: Active Video Game, Comprehensive Theories, Exergame, Metabolic Equivalents (METs), Targeted Theories

INTRODUCTION

An exergame is played on a video game system but requires the player to move their body to interact with a screen avatar engaged in a movement activity. There are three ways to engage an exergame: side-by-side with another person in the same room; individually (or in teams) versus a non-player character (NPC) generated by the gaming system; and remotely against another person. A single gaming console is capable of handling multiple players at once and systems can be connected over the internet to allow for remote, simultaneous play. This format allows for different levels of intensity which may encourage more participation.
Exergames have become an established part of the video game marketplace. A count of games on the Xbox 360 website revealed that 100 out of 156 games available for the gaming system are Kinect games that require or allow for physical movement. These games range in physical intensity from light to vigorous and have fitness values that run the gamut from entertaining play to serious fitness. Physical intensity is often measured in metabolic equivalents (METs). A MET is an approximation of the energy used while engaged in physical activity in relation to energy expenditure at rest (relative to oxygen consumption) (Jette, Sidney, & Glumchen, 1990). MET values at rest are 1.0 and activities that produce light physical intensity (PI) range from 2-3 METs, moderate PI range from 3-6 METs, and vigorous PI is greater than 6 METs (Ainsworth et al., 2011; World Health Organization, 2014). The Compendium of Physical Activities now lists exergames under conditioning. The Compendium lists exergames at 2.3 to 7.2 METs expended depending upon the type of exergame (Ainsworth et al., 2011). The plans of the founders of Atari are coming to fruition as video game players are encouraged to get up and move through exergames and in the process expending energy above resting. This has helped exergaming cross generational lines and may even help generations connect for play and increased interaction (Agmon, Perry, Phelan, Demiris & Nguyen, 2011; Davis, Larkin & Graves, 2002; Kahlbaugh, Carlson & Hauelsla, 2011; Kooiman & Sheehan, 2014).

As exergames have grown in popularity researchers have studied the aspects of these games for their effect on those who use them. Exergames can help improve cognitive functions like visual motor skills and executive functioning (Davis et al., 2011; Kooiman, 2013; Staiano, Abraham & Calvert, 2012). Socially, exergamers report that they feel connected to their opponent or partner in both proximal and remote settings (Bianchi-Berthouze, Kim & Patel, 2007; Kooiman, 2013; Witherspoon & Manning, 2012). Exergame participants also report a high motivation to continue playing (Finkelstein et al., 2011; Kooiman & Sheehan, 2014b; Pasco, Bossard, Buche & Kermarrec, 2011). Heart rates for those who play exergames are often reported to increase to a moderate level of physical intensity (Foley & Maddison, 2010, Maddison et al., 2007; Mellecker and McManus, 2008; Ni Mhurchu et al., 2008; Straker & Abbott, 2007). With all the researched benefits for exergames more studies will follow as researchers go deeper and extend research into unrealized potential future uses and problems for this genre of video gaming.

After nearly a decade of research a single theory for exergames has not been suggested. Previous researchers have relied on existing theories to guide them. Over a dozen theories have been used by authors of research into exergaming. With all of this research and the many theories that have been used it is time for an examination of these theories as to their relevance for exergaming. This paper endeavors to review the existing literature to identify what theories are being used in research and to delineate what the components of each theory are. A literature review was conducted using the Trident International University online library. This library allowed access to the ProQuest Summon® Service search engine which allowed for a search of multiple libraries including Blackwell, Gale, LexisNexis, Academic, Sage, Springer, Emerald, ProQuest, Taylor & Francis, IEEE, and Project Muse resulting in a search of more than 6,800 publishers and 94,000 journal and periodical titles.

The terms ‘exergame’ and ‘active video game’ were entered into the ProQuest Summon® Service search engine. The search was refined by looking for only peer reviewed articles and those for which full text was available. This allowed the researchers to look at the entire paper when looking for theories and to limit the search to academic journal articles. Articles were scanned into a word processor and then a search for the words theory and concept was conducted. Articles that contained either of these words were read to determine if a theory was used in the construction of the paper. Those that used a theory helped to create the database of theories that follows.
Exploratory Play in Simulation Sandbox Games: A Review of What We Know About Why Players Act Crazy
Dominicus Tornqvist (2014). International Journal of Game-Based Learning (pp. 78-95).
www.igi-global.com/article/exploratory-play-in-simulation-sandbox-games/116520?camid=4v1a

Multiplayer Kinect Serious Games: A Review
Ali Alshammari and David Whittinghill (2015). International Journal of Game-Based Learning (pp. 45-61).
www.igi-global.com/article/multiplayer-kinect-serious-games/130631?camid=4v1a