WHAT VIDEO GAME GENRES ARE TEACHING US

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ABSTRACT

Video games are more than just a hobby for many people. Some studies suggest that learning can occur during video game play. However, few studies exist that actually evaluate potential learning in popular video games. The purpose of this exploratory study was to identify video game genres, understand what might be learned from playing different genres, and then compare the similarities between genres in terms of learning constructs. In this study, 12 main genres were identified. These genres were: role-playing games, massively multiplayer online role-playing games, first-person shooter, sports, puzzles, real-time strategy, action, turn based, simulation, fighting, kinetic controlled, and casual. In addition, the study identified 19 learning constructs learned from playing these different video game genres. The learning constructs were: coding/computer programming, conflict management, communication skills, creating a community, crafting, critical thinking, attention to detail, building management, hand-eye coordination, how to be competitive, interpersonal skills, map awareness, conducting research, economics, reading comprehension, resource management, strategy, spatial thinking, and time management. Overall, 11 of the 12 video game genres taught at least one learning construct, while some taught up to 18 of the 19 learning concepts. Casual games were the only genre that did not teach a single learning construct. Eight of the twelve video game genres taught at least half of the

19 learning constructs. Each learning construct was taught by at least three video game genres, except for one. Coding/computer programming was not taught by any of the genres. The results allowed the development of a grid that mapped the learning constructs according to the genres it taught, which in turn can be used by educators to introduce video games to teach those learning constructs identified in this study. Overall, the study concluded that with better research, instructors could make more informed decisions when selecting and incorporating video games into their curriculum.

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CHAPTER 1. INTRODUCTION

In an industry grossing over $9.5 billion in 2007, computer and video games have become a popular pastime for players of all ages in Western and Asian societies ("The Entertainment Software Association - Industry Facts," 2012). It has been predicted that by 2017 the annual revenue of the video game global market will reach $79 billion ("DFC Intelligence Forecasts Worldwide Online Game Market to Reach $79 Billion by 2017," n.d.). Video games are found everywhere, including video game parlors, personal computers, and even mobile devices such as tablets and cellular devices. People are growing up playing video games. Some current research indicates this passion for video games may be affecting the way people learn (Chazerand & Geeroms, 2008; Gee, 2007b, 2007b; Prensky, 2003).

Video game players, also known as gamers, use cognitive skills to pass stages, vanquish monsters, solve puzzles, or beat game challenges. Gee (2003) describes a video game as a world that a gamer integrates and participates in, a realm only available via games. In order to progress in games, players must be able to make decisions, attain information, complete complex tasks, and manage resources. Video games have also become a mainstream form of entertainment even encroaching onto time traditionally used by other media such as television, music, and movies. The average age of a gamer is 35 years old and most have played video games for an average of about twelve years. Pew Internet and American Life Project reports nearly 99% of teen boys and 94% of teen girls are playing video games (Lenhart, Kahne, Middaugh, Macgill, Evans, & Vitak, 2008).

As shown in the literature review (Chapter 2), to date, much attention has been focused on the aggressiveness and the social science behind how video games affect people. In more recent studies, researchers are demystifying the notion that video games are more than just violence and mindless activity. They are increasingly finding that positive learning occurs during game play (Gee, 2007a, 2007c; Shaffer, Squire, Halverson, & Gee, 2004). The current generation of serious games include powerful simulations of real-world systems that activate critical thought and decision making (Gee, 2003; Jenkins, Klopfer, Squire, & Tan, 2003). Video games may be used as a highly effective learning tool that satisfies the demands of learners who want to be interested and engaged with curricular content (Prensky, 2003). While there are many studies and popular articles on gaming, the focus here is on learning through video games and focuses on the research and analysis of how video games are affecting learning.

James Paul Gee (2007b) conceptualized 36 learning principles that are built into good video games based on observations of children playing video games and reflecting on his own immersed game play. He contrasted these game-based learning principles with the school-based education process and noted how the two are vastly different. The author offers up the argument that elements of learning exist everywhere in life and in other forms of media, just as it exists in video games. Gee argues that when people learn from video games, they are learning a new literacy. This learning literacy goes beyond reading and writing and defines learning through video games as the use of video images, symbols, and graphical environments to convey learning (Gee, 2007b).

A study tested the hypothesis that playing action video games can improve an individual's ability to make quick and accurate decisions, and found this hypothesis to be

true (Green, Pouget, & Bavelier, 2010). The researchers studied two groups of males -- those who had played video games five times a week for a year, and those who had not. They asked the participants to watch moving dot arrays at various speeds on a computer screen and to quickly identify the main direction the dots were moving. From the two groups, the males that played video games were substantially faster and more accurate than their counter parts. By using this visual perceptual decision making task, the researchers concluded that action video game players learned probabilistic inference skills from playing video games.

In a correlation study, 160 children were tested to see if playing a simple video game would help their attention switching and concentration (Dunbar, Hill, & Lewis, 2001). It was found that children that were better at the game were more effective at switching their attention. This indicated that video game playing students were more likely to show higher awareness. Thus, it was correlated that the students who played the simple video game were more aware of traffic and could cross the road in an overall safer manner than students who did not play the game.

A study was conducted on pre-service elementary teachers learning about basic physics principles using a video game called *Supercharged!* (Anderson & Barnett, 2011). The purpose of the study was to find whether or not video gaming technology would facilitate understanding of basic electromagnetism concepts. The control group learned through a series of guided inquiry methods and the experimental group played *Supercharged!* during the laboratory sections of their science course. The researchers found that the experimental group performed better than their counter parts. Results also showed that video games can lead to positive learning outcomes as demonstrated from

the increase in test scores from pre to post assessments. This study also suggested that video games integrated with a hands-on activity are powerful in supporting student scientific understanding.

A study was done examining children's informational technology use (computer use, Internet use, video game playing, and cell phone use) and their creativity (Jackson, Witt, Games, Fitzgerald, Eye, & Zhao, 2012). There were 491 participants who were asked open-ended questions about creativity stimuli. Of the four information technologies, playing video games was the only technology that indicated any relationship with creativity. Neither gender nor race influenced any differences in creativity. The overall conclusion of the study was that greater video game play is associated with greater creativity.

Maya (2007) argues that video games have the potential to address some of the ills of US science and engineering education. The study suggested that the principles of science and engineering could be taught not only by playing video games but also through developing games. It was found that learning via game design exercises, for specific content, significantly increased the depth and complexity of what was learned.

There is a call of educational research to examine its theories and determine how they apply to the future of learning (Shaffer et al., 2004). Squire (2011) states that researchers need to start focusing on the relevant educational purposes of what video games have to offer and focus on skills and attitudes.

The influence of video games on student development and learning is such a new phenomenon that more research is still needed. Different researchers have concluded that games affect players in different ways. The effects of video games have been found to be

both negative and positive and include violent behavior, tendency towards obesity, improvement in hand-eye coordination, better workforce employees, better skills acquisition and increased critical thinking (Anderson & Dill, 2000; Bailey, West, & Anderson, 2010; Gee, 2007a; Jenkins, Klopfer, Squire, & Tan, 2003; Shaffer, Squire, Halverson, & Gee, 2004). Although the findings in the area of learning may be mixed, many of the studies conducted looked at a specific video game to measure the effects or degrees of learning. Overall, research to date has been generally positive regarding video games and learning.

Statement of the Research Problem

A review of current literature (provided in Chapter 2) reveals a lack of research on the topic of video game genres with practically no research on video game genres and learning. The current trend of video game research is based on studies that focus on a particular video game and not the video game genre that it belongs to. In the real world, video game titles have a shelf life governed by its popularity. If the game becomes boring, obsolete, or replaced with a better version, then that video game is put aside and becomes a distant memory. Video game genres tend to stay the same no matter what game title is released under a particular genre.

It was the researcher's goal to determine what video game genres are identified by video game players. The researcher was then able to identify what they have learned from playing the different video game genres, and to analyze if there were similarities in learning between the different genres. The purpose of this study was to explore video game players' identification of video game genres, what they have learned from playing the genres, and if the different video game genres shared similar learned constructs.

Research Questions

RQ1. What are the video game genres identified and defined by video game players?

RQ2. What are the learning constructs (skills, abilities, and/or dispositions) identified and defined by video game players from playing the different video game genres?

RQ3. Are there video game genres that are similar to other video game genres in terms of learning constructs?

Conceptual Framework

The conceptual framework that was used in this study was Personal Construct Theory (PCT) (Kelly, 1963). PCT uses a technique called the Repertory Grid (RepGrid) which identifies the ways people give meaning to their experience. This exploratory, qualitative and quantitative study examined video game players' identification of video game genres and perceptions of learning from playing those video games. It was in the interest of the researcher to use the Personal Construct Theory to also observe if there were similarities between the different genres according to the different learning constructs.

Need or Significance

The significance of this study was to examine video game learning in terms of video game genres. There is a lack of studies on video game genres in current literature. Adding knowledge to the area of video game genres is critical to gaming research because most existing research is based upon single game examination not multi-game analysis as conducted in this study. There is also a growing need to study video games in

general due to it being a young field of study. The call for more in-depth video game research is satisfied by this study and more importantly, this study addresses the need to examine video game genres and learning due to the lack of its presence in the current field of research.

Research Design and Methodology

The purpose of this study was to identify the different video game genres, identify what was conceptually learned from playing these video game genres, and whether the different video game genres shared any of the same learning constructs. The general purpose was to explore video game genres and learning. This study aspires to add to the body of knowledge in the research field of video games and learning.

Description of research methodology

This study uses a methodology that employed both qualitative and quantitative components. Focus groups were used for the qualitative portion while surveys were administered to a sample population for the quantitative component. The nature of the PCT framework is essentially a mixed methods approach that is utilized to identify and measure elements and perceived constructs. In this particular study, the qualitative portion will identify the different elements (video game genres) and learning constructs (skills, abilities, and/or dispositions). PCT was developed to measure participant knowledge through a psychological process that employs the Repertory Grid. The Repertory Grid is a tool used to qualitatively identify elements and constructs, which will be later used to develop a measure for participant thinking and personal theorizing.

The second part of the PCT was the development of a survey tool used to measure degrees to which the elements and constructs were related. With this quantitative tool, the

researcher was able to test a larger sample to quantitatively determine similarities between the different video game genres in terms of learning constructs.

Participants and site

Eight undergraduate and graduate students (18-30 years old) attending a Research I University were used for the qualitative portion of the study. The students are affiliated with the video gaming club that is officially registered within the university system. The school is a four-year public institution of higher education and is classified as a Research I University on the Carnegie Classification of Institutions.

As recommended for qualitative research (Merriam, 2009) the researcher employed purposive sampling in which participants are chosen based on certain criteria. Theoretical sampling in which subjects were chosen based on theoretical categories provides a certain polar type, rather than a sampling of the general populous (Eisenhardt, 1989).

The second quantitative portion of the Personal Construct Theory framework used a quantitative approach that surveyed a sample of the target population. In this quantitative portion, the themes developed from the qualitative portion of the study were used to create the survey tool. In this survey tool, a demographic survey was used to collect general and psychographic characteristics of the participants in terms of education level, video game playing, and their general video game playing interests. The survey finally tested whether or not they agreed if there were any relationships found between the themes developed from the first portion of the framework. All information data collected were examined in the discussion of the results in the last chapter.

Instrumentation

Personal Construct Theory relied on the Repertory Grid (RepGrid) instrument to identify the elements and constructs and measured similarities between the different themes (Kelly, 1963). The RepGrid was used to answer the three research questions in this study. The small group phase was used to identify the elements, or in this study video game genres. As the elements were identified, the participants identified the different learning constructs. With the elements and learning constructs identified by the RepGrid, the survey tool was developed. The survey tool was created to distinguish, on a scale, whether a learning construct was or was not learned from playing any of the video game genres. The survey tool included some demographic information and the scaled items (see Appendix C).

With the survey tool results, the percent of agree responses were observed to see which video game genres were able to teach the different learning constructs. The selected similar genres are discussed and analyzed in the final chapter.

Data collection

Since the first part of the data collection came directly from focus group interviews, the data collected was immediately entered into the RepGrid. There were two focus group interviews, thus the two RepGrid elements and construct themes were both collected and compared to one another. Follow up interviews were used for clarification and inter-rater reliability. Once the data were compiled from the qualitative stage of the research, another survey tool was developed to be distributed amongst a larger sample of the target audience. The data collected from the qualitative portion of the framework took about a month of analysis and review to develop the final survey tool for the quantitative

portion of the research. Microsoft Excel was used to analyze the data that were produced by the survey to compare the agree percentages amongst the different elements.

Data analysis

Using the RepGrid produced during data analysis, themes within the data became apparent. These themes were later used to answer the research questions posed in this study. The tool has been developed and adapted for different exploratory studies to examine different constructs in various fields. The instrument has been utilized often enough that the application of the RepGrid technique guarantees objectivity and reproducibility of the results as well as respectable reliability coefficients (Fromm, 2004). The RepGrid technique was adapted in this study to utilize two methods of analysis. The first was the hermeneutical approach which looks for meaning in the conversations and responses during the focus group and one-to-one interviews. The second was via statistical and comparative analysis. Triangulation is achieved because the RepGrid tool is a valid tool used in Personal Construct Theory (Devers, 2011; Honey, 1979; Kelly, 1963; Kreber, Castleden, Erfani, Lim, & Wright, 2003; Tan & Hunter, 2002; "Understanding Personal Construct Theory - George Kelly," n.d.). The RepGrid tool technique used qualitative and quantitative means to identify psychological meanings, definitions, perceptions and interpretations made by the representative sample of the target population.

Limitations

One of the limitations of this study was that the participants were from a select target audience; therefore, data analyzed in this study are only applicable to this target population. Another limitation was that the study was exploratory. Much of what is

covered in the discussion chapter is from the researcher's point of view. Therefore, more studies need to be conducted to capture more accurate results. Another limitation recognized by the researcher was the fact that the survey was administered online and anyone who had the link could have shared it with non-target population participants. The last limitation was that the majority of the participants were male.

Summary

The main objective of this study was to contribute new research to the field of video games and learning. This exploratory study began as an inquiry into the different video game genres. The researcher sought to determine what these genres were teaching 21st century learners. As themes emerged in the literature regarding learning through video games, there was a clear lack of studies that examined video game genres and what was being learned from them. There was also the question of whether or not those learned constructs were similar amongst the different video game genres. Future studies could address how educators might benefit from the results of this study as they relate to utilizing video game genres as tools to teach, guide, or explain learning constructs. Another potential benefit of better understanding video game genres is that players could apply what they learn from video game genres to real world settings. Ultimately, what is learned from playing video games should be used to enhance or improve the learning experience.

CHAPTER 2. REVIEW OF LITERATURE

Much of the video game research, exploring the use of video games in different contexts, is new and has only become a viable research topic within the last few decades. This research spans many disciplines including educational psychology, educational technology, human-computer interaction. The studies examined here reflects research directions based on three principles: the effects of games on people, knowledge gained from playing video games, and ways games are used in skills-based training. With the popularity of video games already influencing the lives of our next generation, it is important to know what students and adults are learning from playing video games.

Little comprehensive scholarly research exists on video gaming compared to other areas of technology. To address the gap, this review of literature will provide an overview of video gaming research related to video game history, research, and genres to present methodology for identifying perceived learning constructs. The review of literature will be divided into three major sections: video game research, video game genres, and Personal Construct Theory (PCT). The first section will cover video game studies as they relate to video game player behaviors, social science, video games and health, learning from video games, and skill-based learning. The second section on video game genres will cover reports on video game genres and explore reasons to explore video game genre research. The last section will introduce PCT and research that has used the PCT framework.

There is no doubt that we live in an information age – a part of the digital age that has most people connected via computing advancements in different industries, global

economies, and personal lifestyle ("Information Age," n.d.). During the development of the information age, we have grown into a networked society (Castells, 2011). The way we learn and perceive the world is now influenced by many of the new innovations generated from emerging technologies in computing, communications, and human development (Pink, 2006). One of the segments of this information age comprises video games and its players.

Research suggests that video game playing contributes to the building of skills necessary for future careers in a modern society. This idea is discussed at conferences such as the Serious Games Summit, which brings experts from both education and the gaming industry together to discuss and share ideas to improve their products (Corbit, 2005). Post-secondary institutions are also offering courses on video game design and research, and sometimes even offer degrees related to this field (Mangan, 2005).

Video Game Brief History, Revenue and Demographics

Video games have followed technological advances from their early years as single player console games to the current massive multiplayer online games. These machines once required lab-sized storage spaces and they now fit into a person's pocket via their cellular phone.

The first video game *Tennis for Two* was created in 1958 by William Higinbotham. It was played on an oscilloscope located in the Brookhave National Laboratory. In 1962, Steve Russell developed the first computer game called *Spacewar*. Ted Dabney and Nolan Bushnell, founders of Atari, developed the first arcade game called *Computer Space* and *Pong* in the early 1970s. Ralph Baer created the first commercial video game console in 1972. It was called *Magnavox's Odyssey* and it

inspired a new world of video game development, gameplay, and innovation (John Anderson, 1983; Bellis, 2012; Brookhaven National Laboratory, n.d.). Video games may have begun as a free-to-play tennis game, but they have since grown into a multi-billion dollar industry (Entertainment Software Association, 2007).

In addition to the contributing more than 4.9 billion to the gross domestic product, the industry also employs almost 120,000 workers. The video gaming industry has been growing at a 10 percent rate from 2005 to 2009. This fast growing industry has produced revenue for many communities and is growing as one of the more popular forms of personal entertainment and encroaching into entertainment mediums such as television, music and movies ("The Entertainment Software Association - Industry Facts," 2012). The Entertainment Software Association (2012) reported that consumers spent almost $25 billion on video game hardware, accessories, and video games in 2011.

The average video game player is 30 years old and the average age of video game purchasers is approximately 35 years old. Of all video game players, women make up 47 percent. Sixty-two percent of gamers play social games, while others play either online or face-to-face games. One-third of all video game players play games on their smartphones and a quarter of them play on different handheld devices (Lenhart, et al., 2008). Pew Internet and American Life Project (Lenhart, et al., 2008) report that 99% of teen boys and 94% of teen girls are playing video games. These statistics address the demographics of video game players not their psychological and physiological profiles.

Video Game Research

Player Behaviors

Early studies in video games are based on the psychological pretext that video games are the cause of violence and aggression in players. The implication of games in high school shootings prompted the government to investigate and take legislative actions against 'video game violence' (Olson, 2004; Sternheimer, 2007). The early influx of aggressive or violent behaviors from video games dominated early research on video games.

Researchers concluded that video game playing that includes violence, in general, had a negative behavioral influence on the video game players themselves. Some research suggested that violent games increase physiological arousal (Ballard & Weist, 1996). A study conducted in human personality and social psychology, research using the General Affective Aggression Model, predicted that exposure to violent video games increased aggressive behavior in both the short and long term (Anderson & Dill, 2000). A similar study also sought to see if video-generated blood affected a video game player's aggression, hostility, and arousal. The researchers proved their hypothesis that video games with the most blood activated arousal and more aggressive thoughts in its players (Barlett, Harris, & Bruey, 2008). Another study found students who played violent video games increased aggressive emotions and moodiness (Griffiths & Hunt, 1998).

Another observation researchers made was that if a child began playing computer games before their adolescence, it appeared that they were more likely to show a dependence on playing computer games during their life. Griffiths and Hunt's (1998) analysis indicated that one in five adolescents were dependent on computer games and

that boys were more likely to be disposed to show dependency on playing computer games versus their girl counterparts.

A Stanford study confirmed Griffiths and Hunt's analysis and found that males were more likely to be "hooked" on video game playing than women (Hoeft, Watson, Kesler, Bettinger, & Reiss, 2008). This study used functional magnetic resonance imaging (fMRI) to study the mesocorticolimbic system pathway the brain takes when performing tasks in a simple computer game. This pathway is one of the dopaminergic pathways in the brain, sometimes believed to be the reward pathway of the brain ("Dopamine Functionsadded," n.d.; "Mesolimbic pathway" n.d.). In examining the neural process of playing a space-infringement game with a control task, males showed greater activation and functional connectivity compared to females in the mesocorticolimbic system. The study identified that this may be due to males having higher motivational states in playing video games as well as the gender differences in reward prediction, learning reward values, and cognitive state while playing.

A study was conducted to review the existing research and previous coverage about the effects of violent video games on adolescent behavior. The results showed that there was little evidence or a significant link between exposure to violent video games and real-life violence or crime (Olson, 2004).

Media outlets seem to focus on research arguing about the ill-effects of violent video games. There is a tendency in media outlets to make sweeping generalizations about causality based on isolated incidents of violence and video games. Lynch (1999) suggests that physiological arousal is greater in individuals who are naturally more aggressive when exposed to violent games. The first downfall is the fallacy that video

games cause violence. The second is that the study neglects to identify whether a person is predisposed to being a violent individual. With its media counterpart, research publications may be biasing their findings that violent video games may cause aggressive behavior among players. A meta-analytic review evaluated 25 published studies that indicated a correlation or causal relationship between violent game play and actual aggressive behavior, the results found that the studies made assumptions that violent video game play caused actual aggressive behavior (Ferguson, 2007).

Ferguson, Rueda, Cruz, Ferguson, Fritz, and Smith (2008) followed up with a series of studies that examined the relationship between violent video games and its effect on aggression. There were several key findings that they reported. The first finding was that males were generally more aggressive than females, but it also found that playing violent video games did not cause any difference in aggression. The second major finding was that family violence, trait aggression, and male gender were predictors for violent crimes, but it did not include exposure to violent video games. The last result from their study concluded that family violence and trait aggression were better predictors of violent crime than exposure to video game violence. Another study indicated that playing violent video games reduces depression and hostile feelings in players through mood management (Ferguson & Rueda, 2010).

In terms of addiction, there is no formal diagnosis of video game addiction in current psychological or medical literature. Media sites have been known to title their reports as video game addiction, whilst researchers do not officially use the term because it does not follow the Diagnostic and Statistical Manual of Mental Disorders' definition for addiction. In 2007, the American Psychiatric Association turned down the proposal

to include video game addiction as a mental disorder (American Psychiatric Association, 2007).

By now, even people who do not play video games understand that video games are a significant form of entertainment. With this shift in video game playing as a major form of entertainment, many researchers are trying to discover what video games are teaching its players. In the literature, researchers have been studying some of the different ways video games have affected the video game players. In addition to how video games affect video game behaviors, the next set of studies will focus on the social science to video game research.

Social Science to Video Games

This section of the literature will introduce the social science approach to the effects of video games. Computer and video games are a very popular activity for players of all ages in Western and Asian societies (Hartman & Klimmt, 2006). There are various lenses and approaches to the social science study of how video games or video game playing has affected video game players. The social science to video game playing includes disciplines in social studies, psychology, health education, neural functions, and political science. The following research will introduce some of these social science studies as well as report the findings and the effects it has had on video game players.

Community of Practice is one way the effects of video games in the massively multiplayer online environment could be observed. Wenger's (1999) notion of a collective group coming together over time by the sustained pursuit of a shared enterprise can be easily seen in video games that promote social behaviors in massively multiplayer online gaming environments (Galarneau, 2005; Steinkuehler, 2004). Of key importance is

that individuals learn within these environments and their contributions affect their learning community via team-work, shared learning activities, resourcefulness, and innovation.

Video arcades in the 1990s provided youths a place to meet and hang out. If school was not in session, or if there was a lack of other activities, these video game arcades provided social experiences for adolescents (Michaels, 1993). Mitchell (1985) interviewed twenty families that had a new video game console in their home and asked them about their attitudes towards playing video games. The results suggested that video games brought the family together for shared play and interaction, in the same way board games had in previous decades.

A research study conducted by PopCap Games and Dr. Tomas Chamorro-Premuzic of Goldsmiths University, specifically looked at the role of 'casual games' in helping parents and grandparents bond with their children and grandchildren (Chamorrow-Premuzic & PopCap Games, Inc., 2011). With a sample of 3,250 participants, the study estimated that at least 2.8 million parents play casual games with their children and many grandparents used casual games to become closer to their tech-savvy grandchildren. Other key findings of the study found that close to a third of the participants played computer games daily with their children. One in three of the participants reported greater bonding with their children as a result of playing casual video games with them. Four out of five participants described the video game playing time as quality time and another third of the parents believe that their children were able to concentrate better due to playing casual games.

The Pew Internet & American Life Project has reported on some of the issues, attitudes, and trends of young adult video game players (Lenhart et al., 2008). In this Pew Internet Project, Princeton researchers sampled 1,102 teenagers between the ages of 12 to 17 and a parent or guardian to answer survey questions that examined which teens are playing video games, the games and equipment they are using, the social context of their play, and the role of parents and parental monitoring. This was the first large-scale quantitative study that aimed to explore the relationship between video games and civic engagement. Some of the key findings were that almost all teenagers play video games, they all play different kinds of video games, gaming is a social experience, and that video game players were learning civics from playing video games.

The social science to video game playing broadly looked at how video games have affected video game players. However, the studies that have been conducted do not address the disciplinary knowledge or skills related to playing video games. In addition to how social science viewed gaming, studies have also examined the affordances of gaming in learning.

Studies on Video Games and Health

A study on casual video games was conducted to determine whether playing *Bejeweled II* would improve mood and/or decrease stress (Russoniello, O'Brien, & Parks, 2009). The researchers measured electroencephalography (EEG) brain activity and heart rate variability (HRV) to understand whether or not playing a video game may help prevent or treat stress-related medical disorders. The participants demonstrated significant mood improvements, including decreased tension, depression, anger, vigor, emotional fatigue and confusion. The results of this study suggest that the use of casual

video games could potentially treat psychological and physical disorders ranging from depression to diabetes.

Another study examined the relative effect of interactive motion games, "exergames", on energy expenditure among children of various body mass indexes (BMI) (B. W. Bailey & McInnis, 2011). There were 39 participants of both boys and girls with a mean age of 11.5 years old. The participants needed to walk on a treadmill at three miles per hour to give a baseline of their energy expenditure. The next part of the study examined their energy expenditure when treated with six different exergames. The metabolic equivalent task (MET) value was the standard measure for the participants' energy output level at rest, walking, and excergaming. The results reported that all six exergames elevated energy expenditure from moderate to vigorously intense as compared to being at rest. Five of the six exergames showed higher levels of energy expenditure when compared to walking on a treadmill at three miles per hour. Other findings were that all children generally enjoyed exergaming as a form of exercise with the higher enjoyment ratings coming from participants with higher BMIs. The overall conclusion was that exergaming has the potential to reduce sedentary time, increase adherence to an exercise program, and promote enjoyment of physical activity for all children regardless of BMI. Although, not clearly indicated as a genre study, this research demonstrates how the study of a video game genre may produce positive results.

In a qualitative study on visual capacity using a first-person shooter video game, it was found that playing an action video game enhanced contrast sensitivity, providing a complementary route to eyesight improvement (Li, Polat, Makous, & Bavelier, 2009). Researchers saw that people who played action video games were able to see subtle

differences in shades of gray. The study could be beneficial to those who have amblyopia, also known as lazy eye, and those who cannot see well in the dark. The researchers suggested that using a video-game training program could help to improve their contrast sensitivity.

Another health study examined energy expenditures of children playing a dance game and an interactive sports game. *Dance Dance Revolution (DDR)* and Nintendo's Wii Sports were measured against treadmill walking and watching television (Graf, Pratt, Hester, & Short, 2009). Low level *DDR* and Wii bowling reported a 2-fold increase in energy expenditure when compared to television watching. They then reported a 3-fold rating of energy expenditure, hear rate, and perceived exertion when playing Wii boxing, *DDR* level 2, or walking at 3.5 miles per hour.

Like the mesocorticolimbic system pathway research studied by Hoeft et al. (2008), researchers utilized a fMRI to examine the effects of video-game experiences on the neural control of increasingly complex visuomotor tasks (Granek, Gorbetemail, & Sergio, 2010). In this study, researchers compared males who played video games for at least four hours a week for at least the past three years with males who had not. The participants were asked to complete increasingly difficult visuomotor tasks while controlling a joystick, looking one way, then reaching in another direction, while sitting in an fMRI machine to measure brain activity. The key finding of the study was that less-experienced video game players utilized more of their parietal cortex of the brain (hand-eye coordination center of the brain), while more-experienced video game players utilized their prefrontal cortex of the brain (higher-level decision making part of the brain) while completing the tasks. The data suggests that cortical processing becomes

more efficient in spatial attention and that complex visually guided reaching is affected by video game playing.

These studies on health, well-being, and visuomotor skills are part of the growing research of video games. Whether video games increase personal feelings or attitudes toward activity, playing video games clearly have some sort of effect on video game players. It has also been noted that video games do affect both the brain and the visual senses.

Learning through Video Games

So far the focus of this literature review has been about the aggressiveness and the social science behind how video games affect people. Researchers are correcting the notion that video games are just violence and mindless activity. In fact, they are currently finding that learning occurs during game play (James Paul Gee, 2007a, 2007c; Shaffer et al., 2004). The current generation of serious games include powerful simulations of real-world systems that activate critical thought and decision making (J. P. Gee, 2003; Jenkins et al., 2003). Video games may be used as a highly effective learning tool to satisfy the demands of learners who want to be interested and engaged with the curricular content (Prensky, 2003). This section will focus on the research and analysis of how video games affect learning.

James Paul Gee (James Paul Gee, 2007c) argues in his book there are 36 learning principles built into good video games. Gee identified these learning principles through observation of children playing video games, as well as analysis of his own immersed game play. Gee contrasts his learning principles with the school-based education process and noted how the two are vastly different. The author offers up the argument that

elements of learning exist everywhere in life and in other forms of media, just like how it exists in video games. He also argues that when people learn from video games, they are learning a new literacy. This learning literacy goes beyond reading and writing and defines the learning through video game playing as the use of video images, symbols, and graphical environments (James Paul Gee, 2007c).

A study that tested the hypothesis that playing action video games can improve an individual's ability to make quick and accurate decisions was proven to be true (Green, Pouget, & Bavelier, 2010). In this study researchers observed two groups of males, those who played video games five times a week for the past year and those who had not. They asked the participants to watch moving dot arrays at various speeds on a computer screen and to quickly identify the main direction in which the dots were moving. From the two groups, the males that played video games were substantially faster and more accurate than their counter parts. By using a visual perceptual decision making task, the researchers concluded that action video game players have learned probabilistic inference skills from playing video games.

A correlation study that observed 160 children tested to see if playing a simple video game would help their attention switching and concentration (Dunbar, Hill, & Lewis, 2001). It was found that children who were better at the game, were more effective at switching attention. Thus, it was correlated that video game playing students were more likely to show higher traffic awareness and could cross the road in an overall safer manner.

A study conducted on pre-service elementary teachers examined the effectiveness of learning about basic physics principles using a video game called *Supercharged!*

(Anderson & Barnett, 2011). The purpose of the study was to determine whether or not video gaming technology would facilitate the understanding of basic electromagnetism concepts. The control group learned through a series of guided inquiry methods and the experimental group played *Supercharged!* during the laboratory sections of their science course. The researchers found that the experimental group performed better than their counterparts. Results also showed that video games can lead to positive learning outcomes as demonstrated from the increase in test scores from pre to post assessments. This study also suggested that video games integrated with a hands-on activity are powerful in supporting student scientific understanding.

Another study was done that examined children's informational technology use (computer use, Internet use, video game playing, and cell phone use) and their creativity (Jackson et al., 2012). There were 491 participants who were asked open-ended questions about creativity stimuli. Of the four information technologies, playing video games was the only technology that demonstrated any relationship with creativity. Neither gender nor race influenced any differences in creativity. The overall conclusion of the study was that greater video game play is associated with greater creativity.

Maya (2007) argues that video games have the potential to address some of the ills of US science and engineering education. The study posited that the principles of science and engineering could be taught through video game play and also through developing games. Learning specific content via game design exercises significantly increased the depth and complexity of what was learned.

There is a call of educational research to examine its theories and determine how they apply to the future of learning (Shaffer et al., 2004). Squire (2011) states that

researchers need to start focusing on the relevant educational purposes of what video games have to offer and focus on skills and attitudes. The next section of this literature review will introduce the use of computer games used in education for training in order to enhance skills. In addition to how people are learning from playing video games, studies have also examined video games as a contributor to skills based training.

Video Games and Skills Based Training

Research suggests that video game playing contributes to the building of skills necessary for future careers in modern society. The idea of video games as a career and as a part of education are discussed at conferences such as the Serious Games Summit, which bring experts from both education and the gaming industry to discuss and share ideas to improve their products (Corbit, 2005). Post-secondary institutions are also offering courses on video game design and research, and sometimes offer degrees related to the field (Mangan, 2005). Additionally, skill-based video game training has been growing over the last decade and studies are starting to examine the effectiveness of its use.

De Aguilera and Mendiz (2003), in their meta-analysis of studies on games from the 1970's to the 1990's, concluded that adolescents with medium- or long-term experience playing video games show greater visual capacity, motor activity, and spatial abilities-reflexes and responses. They also found that early research seemed to have focused on the development of skills including psychomotor skills. In addition, the researchers found that the first studies on cognitive abilities in game studies focused on the potential of games in the development of learning processes such as trial and error. In

the critical analysis of video game studies, simulators have the greatest potential for educating through knowledge or skill building.

Another meta-analytic study examined the effectiveness of video games and simulation technology as tools for training employees (Sitzman, 2011). This study analyzed 65 existing studies on the use of games and game-related technologies in training programs and collected data from a comparison group (n=6,476) of trainees that did not have the aid of the video gaming technologies in their program. The trainees who used video games in their training reported factual knowledge that was 11% higher, procedural knowledge that was 14% higher, retention that was 9% higher, and post-training self-efficacy that was 20% higher than the comparison group. The study found that trainees learned more when the video game training technology content was actively engaging, a supplement to other instructional methods, and accessible whenever they needed to access it.

An Israeli experimental study was conducted to test the transfer of skills learned from a video game, *Space Fortress*, to the flight performance of cadets in the Israeli Air Force flight school (Gopher, Well, & Bareket, 1994). Cadets who were given 10 hours of video game experience performed significantly better than a control group that did not have any game experience. The participants who played the video game reported improved processing and attention control during flight tasks. Those that trained with the video game increased their successful program completion rate by 30%. The video games success was so substantial that it is now incorporated into the regular training of the Israeli Air Force.

Psychologists from the University of Rochester looked at all existing literature on video game playing. Their findings provided some very interesting insights. Contrary to the idea that video game players are trigger happy and react on limited information, the researchers found that video game players did not lose accuracy (in game or in lab tests) and also became quicker in reaction time. The study also reported that video game players were faster and more accurate at processing information than those who did not play video games. This applied to video game playing as well as real-life situations. Another key finding was that playing video games enhanced performance on mental rotation skills, visual and special memory, and multitasking (Dye, Green, & Bavelier, 2009). The research showed that people who played action video games for a few hours a day over a month improved their spatial resolution by 20 percent. The research concluded that training with video games may serve to reduce gender differences in visual and spatial processing, and may hinder cognitive decline associated with age.

Researchers found that laparoscopic surgeons who spent at least three hours a week playing video games made about 37 percent less mistakes during surgery and performed surgeries 27 percent faster than non-video game playing laparoscopic surgeons (Rosser et al., 2007). There were a total of 33 surgeons who took part in this study on whether good video game skills translate into surgical prowess. The participants completed three video game tasks that tested reaction time, hand-eye coordination, and motor skills. The study concluded that video game playing skills correlate with laparoscopic surgical skills, and video games may be a practical tool for training laparoscopic surgeons.

A study of 62 males (mean age ~20 years old) with no prior experience in playing golf were asked to participate in a video game based simulator to see if they could learn how to putt (Fery & Ponserre, 2001). The participants were placed into the control group or one of four experimental groups. The experimental groups consisted of two learning groups and two enjoyment groups. The learning group was informed that they were playing the game in order to learn how to putt and the enjoyment group played the game not knowing that they would need to putt after playing the game. Results showed that the learning group did learn to putt and the enjoyment group, to a lesser degree, also learned to putt. The study concluded that if an engaged gamer was purposely playing a game to learn a skill strategy, playing a simulated video game would be useful in skills acquisition.

A review of digital game based literature showed that educators are trying to integrate games into the learning process via having students create games from scratch, have developers build educational games from scratch to teach, and to integrate serious games into the classroom (Van Eck, 2006). This meta-analysis found that games promote learning and reduce instructional time across multiple disciplines and learners. The study acknowledged that success of digital game-based learning is most effective when learning principles are identified, intelligent integration of the learning technologies are utilized, and the understanding of the limits of the medium are established in accordance to learning theories.

The studies on video game based training and learning seems to be the most extensive in video game studies. What is noticeable in many of these studies is that they only focus on a game or two. There is no mention if similar video games from the same

genre would produce the same effects. For the next section, identifying what video game genres exist is the first step towards exploring the topic of video game genre studies.

Video Game Genres

Reports on video game genres

So far, many studies on video games have been case studies that involve the use of a single game or group of games. Individual video games are named in many of the studies because of that game's effects on learners. However, video game genre studies are almost non-existent. Studies or reports that have mentioned video game genres in their study are usually not testing the video game genre, but rather are only identifying what genre the game belongs to. This next section will give the reader an idea of what video game genres exist and examples of games in different genres.

In Gros' (2007) study, the researcher identifies seven video game genres and defines them. Table 1 identifies and defines major genres. The study also notes that classifying video game genres is not easy to do since some games fall into more than one category.

Table 1. Gros' (2007) Seven Video Game Genres

Video Game Genre	Definition
Action games	These games are reaction based.
Adventure games	The player solves a number of tests in order to progress through a virtual world.
Fighting games	These games involve fighting against computer-controlled characters or those controlled by other players.
Role-playing games	Human players assume the characteristics of some person or creature.
Simulations	The player has to succeed within some simplified recreation of a place or situation to achieve a particular goal.
Sports games	These games are based on sports.

Strategy games	These games that recreate a historical or fictional situation to allow a player to devise an appropriate strategy to achieve a goal.

The Lenhart et al. study (2008), reported on video game popularity. Table 2 shows video game genres, video game examples, and the percent of teenagers who reported playing each genre. The study asked what kinds of games teens are playing. The table indicates that for 9 of the 14 genres listed, 47% or more of the participants reported having played a video game from that genre. This implies that the majority of teens are playing a variety of video games spanning several video game genres.

Table 2. Video Game Genres in Order of Popularity (Lenhart et al., 2008)

Video Game Genre	Examples	% of teens who reported playing the game genre
Racing	NASCAR, Mario Kart, Burnout	74
Puzzle	Bejeweled, Tetris, Solitaire	72
Sports	Madden, FIFA, Tony Hawk	68
Action	Grand Theft Auto, Devil May Cry, Ratchet and Clank	67
Adventure	Legend of Zelda, Tomb Raider	66
Rhythm	Guitar Hero, Dance Dance Revolution, Lumines	61
Strategy	Civilization IV, StarCraft, Command and Conquer	59
Simulation	The Sims, Rollercoaster Tycoon, Ace Combat	49
Fighting	Tekken, Super Smash Bros., Mortal Kombat	49
First-Person Shooters (FPS)	Halo, Counter-Strike, Half-Life	47
Role-Playing	Final Fantasy, Blue Dragon, Knights of the Old Republic	36
Survival Horror	Resident Evil, Silent Hill, Condemned	32

MMOGs	World of Warcraft	21
Virtual Worlds	Second Life, Gaia, Habbo Hotel	10

An interesting study was done on whether an individual's personality traits influenced the types of video game genres they play (Peever, Johnson, & Gardner, 2012). This study was conducted over a three-year period with 466 participants. All of the participants completed an online survey describing their preference of video game genres with their personality types measured using the five-factor model of personality. The five personality dimensions examined were openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Significant relationships between personality types and the types of video game genres played were found. Openness to experience was positively correlated to video game genres that required exploration and player quests found in action adventure and platformer games. Significance was also found in task and goal-oriented video game genres. For example, sports or racing would be the preferred video game genre for conscientious personalities. The last personality dimension to show significance was extraversion. Extraverts preferred games with higher levels of interaction like party or casual games.

As mentioned previously, not many studies mention video game genres. Wikipedia lists seven different video game genres. These include action, action-adventure, adventure, simulation, strategy, other notable genres, and video game genres by purpose ("Video game genres," n.d.). A major retailer that develops and sells games, Electronic Arts (EA), sells video games across 23 different video game platforms and has a total of 638 games with 12 different video game genres ("All Games - Electronic Arts," 2012). Table 3 lists the video game genres as well as how many titles are on sale under

each genre. The number of titles per video game genre may be a signifier as to what video game genres are most popular. The three with over a hundred video game titles are sports (127 titles), action (125 titles) and simulation (125 titles). This may be a signifier of the video game genres that the average video game player is playing.

Table 3. Video Game Genres and Number of Games Sold by EA ("All Games - Electronic Arts - EA," 2012)

Video Game Genre	Number of Video Game Titles Available
Action	125
Shooting	67
Horror	4
Sports	127
Racing	46
Role Playing Games (RPG)	31
Simulation	125
Strategy	60
Family	80
Kids	71
Music	13
Puzzle	85

Electronic Arts lists 12 different video game genres and Pew Internet (Lenhart, et al., 2008) identifies 14 video game genres. But there are video game genres not identified by either group that may be genres on their own, such as cell phone games or gambling game genres. The next section will begin to explore the purpose of this study.

Reasons to explore video game genres

Currently, there is no standard classification of video games genres, but it is recognized that the industry, developers, and academics all use different taxonomies for video game genres (Gros, 2007). Caldwell (2004) discusses the importance of video

game genre research. He speculates that video game genres help in organizing the knowledge in the game by how it is played. An example of understanding how to play a video game genre may help the player in succeeding in the game if they have determined the interaction, pace, and point of view that is needed to play the game. Simulation games have demonstrated their ability to enhance a player's skills through practice (De Aguilera & Mendiz, 2003). It might be just as important to identify the potential benefits of playing other video game genres and understand their effects on learning.

Existing literature tends to focus on individual games and their effect on learning, rather than focusing on the video game genres themselves. As a result, a gap in the literature exists because most studies do not go beyond analyzing specific, individual games. Serious games seem to have learning opportunities for children and educators, but information regarding the knowledge and skills learned by players is lacking. It is the intent of the researcher to study what knowledge and skills video game players learn from certain video game genres and whether or not the learned behaviors or knowledge is transferable from one genre to the other. As Gee (2003) suggests, researchers need to examine the internal and external ways an individual develops knowledge content and social practices by treating the video games as semiotic domains. The study would need to examine these semiotic domains by internally examining the content structure paired with the external examination of the social practices such as thinking, interacting, valuing, acting, and believing. In the next chapter, the focus will be on using the Personal Construct Theory to examine the identification of the video game genres, what players have been learning from different genres, and comparing whether or not the knowledge or skills learned in the different genres is transferrable to other video game genres.

Personal Construct Theory

Discovery of self-perceived learning via the Personal Construct Theory

Personal Construct Theory is a qualitative research framework used in management sciences and information systems research. The theoretic framework reveals personal views of research participants regarding the issues being studied. Kelly expresses that people organize their experiences with the world into conceptual classifications called constructs. The Repertory Grid (RepGrid) technique probes the individuals' experiences to gain insight into their concepts, perceptions, or understandings of what happens or what was achieved during the specified experience. The participants' construct establishes criteria to find a sense of meaning, finding control over their environment, and establishing roads to mental health (Kelly, 1963).

The RepGrid technique is the measurement tool that was developed from Kelly's Personal Construct Theory to identify different elements and personal constructs about those elements. In an idiographic context, researchers attempt to survey specialized groups to elicit individual constructs for a chosen research topic. The specified constructs are developed within the group for inter-subjective or shared sense-making to focus on the particular context and research objectives. The application could be used across several disciplines, as introduced by the following research, to understand and make explicit personal meaning of the elements according to their personal constructs (Kelly, 1963; Kreber et al., 2003; "Understanding Personal Construct Theory - George Kelly," n.d.).

An early example of RepGrid use is seen in the consultancy environment for job analysis. The purpose of the RepGrid use in this environment was to obtain key job

characteristics. Honey (1979) identified constructs to capture the chief attributes for overall effectiveness – ineffectiveness. In this early technique, Honey stressed that the researcher should choose constructs that best exemplify each category and best represent each interviewee's own understanding of the topic of the grid. The following studies highlight the use of Personal Construct Theory and the repertory grid in various fields such as communication (Jones & Jankowicz, 1998), tourism (Pike, 2003), market research (Jaeger & Meiselman, 2004), and education (Shih, Chu, Hwang, & Kinshuk, 2011).

Along with developing a RepGrid for the exchange and sharing of personal views and assumptions on various issues, it was also adapted to be used in team building research. A study by Jones & Jankowicz (1998), involved individuals that developed personal constructs based on what they believed would be helpful in team communication building (constructs) when shared with other groups. This study examined individual and group development of constructs that encouraged medical consultants and hospital managers to understand each other's perspectives. The results were used to develop a more collaborative working process and practice between the two disjointed groups.

Another research article that used the repertory grid interviewed tourism practitioners on finding out the most important attributes to traveling in New Zealand (Pike, 2003). The purpose of this study was to find out why domestic tourism was not as high as the offshore tourist market. In this study, the repertory grid was used to interview a purposeful sample of two tourist groups: young singles and middle-class business managers (n= 25). The participants needed to first identify nine destinations and then identify cognitive attributes about them. At the core of their findings, the results indicated

that both groups identified universally attractive attributes when vacationing domestically and offshore. The findings were reported to the New Zealand tourism authority and was used to promote a national campaign on domestic travel by addressing the determinant attributes from this study.

Another study that utilized the repertory grid explored female consumers' perception of meal situations when eating at home (Jaeger & Meiselman, 2004). This research addressed the lack of previous empirical findings to identify what women felt were the most important constructs of food services provided by convenience stores. In this study, nine scenarios were presented to female employees at a military installation and the participants were asked to generate constructs pertaining to food preparation. The major constructs identified in perceived convenience were time and effort. Thus, it was reported that time and effort are the most important constructs to what would drive consumers to use convenience stores for their dinner planning and purchasing needs. The research also concluded that the repertory grid identified those two constructs and also found that they were highly interdependent of each other.

Using the repertory grid, another study focused on how people with intellectual disabilities make sense of their experiences (Hare, Searson, & Knowles, 2011). In this case study, the researchers adapted the repertory grid to describe how people with intellectual disabilities feel when services are provided to them. The paper presented a two case report that illustrates the application of Personal Construct Theory to suitably identify constructs that allow people with learning disabilities to express personal beliefs and thoughts about their therapeutic experiences.

Another article based on Kelly's Personal Construct Theory was used in assessing student learning in science courses (Kreber et al., 2003). This study highlighted the use of the Personal Construct Theory and the use of the repertory grid technique to assess student learning in undergraduate science courses. The use of the repertory grid was powerful in identifying whether or not the instruction they received met the instructors' objectives. By utilizing the grid, students were able to create concept maps as well as identify the relationships between each concept. Thus, the repertory grid led to a useful, formative content assessment for instructors, which helped in improving the instruction.

In a recent article on mobile learning (m-learning), Kelly's personal construct theory and repertory grid technique was used to identify different concepts needed in order to develop m-learning content in a plant and ecology elementary class (Shih et al., 2011). The focus of the study was the use of the repertory grid to guide the development of instructional content on the characteristics of campus plants. Once the researchers identified the concepts in the learning domain, the content was then used in the mobile learning device. These produced positive effects on student learning outcomes in both motivation to learn and actual scores. Thus, the use of Kelly's personal construct theory and repertory grid was used to develop the main learning constructs needed to teach a certain subject while using mobile technologies to present the material.

Summary

It can be concluded from research on video games – whether in humanities, social sciences, or health fields – that playing video games does affect learning. In the research on video games and skills-based training, there was a direct relationship between the playing of a video game or simulation and the improved skills of the player. The focus on

specific video games and their influence on learning or enhancement of skills is generally accepted as a means to discover how video games affect the video game player. But it is the purpose of this study is to move beyond the content presented by single game learning and explore perceived learning from playing different video game genres. Specifically, the researcher wanted to identify different video game genres, identify what has been conceptually learned from playing those video game genres, and determine if different video game genres share the same learning constructs.

Overall, Chapter 2 has indicated the following major points related to research for this project including:

- The number of video game players is growing.
- Different video games may affect players in terms of behavior, health, cognition, and/or health.
- There are many different types of video game genres.

This research examined the gaps found in the previous research. The gaps recognized in this research included:

- A lack of video game studies on game genres;
- A lack of studies that identify video game genres;
- A lack of studies that identify learning constructs (in terms of skills, abilities, and/or dispositions) from playing a video game genres; and
- A lack of studies that observe whether video game genres are similar to others in terms of learned constructs from playing them.

This chapter has looked at issues found in early research on video games and has identified video game genres as the logical area for future research on video games. This

is because of the limited shelf lives of individual games versus a genre that continually stays the same. The complexity of this topic suggests that video game players need to be able to identify different video game genres, identify the constructs learned from each genre, and be able to compare those learned constructs between each of the video game genres identified. The next section of this paper will go into the specific use of the Personal Construct Theory as the framework used to answer the research questions that were developed for this study. The next chapter will also highlight the different variables related to the research design and methodology for this study.

Conceptual Framework

The theoretical framework to study perceptions of learning will come from George Kelly's (1963) Personal Construct Theory (PCT). This theory was developed to measure participant knowledge through a psychological process known as a repertory grid. The repertory grid is the tool used to qualitatively identify elements and develop a measure for participant thinking and personal theorizing. Working within the framework of PCT, the research aimed to survey video game players' identification of video game genres, identification of perceived learning constructs from playing those genres, and the ability to determine if video game genres were similar to each other in terms of shared learning constructs.

Kelly's personal construct theory and repertory grid have been successfully used to elicit and analyze knowledge by identifying different concepts in various perceived learning domains. Personal Construct Theory has been used in various fields of study such as communication (Jones & Jankowicz, 1998), tourism (Pike, 2003), market research (Jaeger & Meiselman, 2004), and education (Shih, Chu, Hwang, & Kinshuk,

2011). The following paragraphs describe how these methodologies were used within the different fields of study.

Personal Construct Theory (PCT) was used in a health journal study on communication and helped identify ways health professionals and management could be better communicators with each other (Jones & Jankowicz, 1998). The study recognized that the two constituents were not effectively communicating and utilized the RepGrid to design a framework that identified how each department could better communicate with each other.

In tourism research conducted by Pike (2003), the study results contributed to the literature of demonstrative value of the repertory grid as a proven but underused qualitative tool for investigation. The researchers used this method for the development of group application. The researchers reported there was little research on the subject of domestic tourism in their country. Thus they wanted to use a methodology that quickly and cost-effectively discovered what their own citizens perceived to be interesting about their local tourist destinations. The RepGrid technique was used to measure local tourists' perceived interest in visiting domestic destinations. The focus groups were given images of nine local destinations and were asked to develop their perceived interest constructs for each location. The results were reported to the national tourism authority to address what interested local travelers when visiting different local destinations and they presented recommendations to redesign marketing for the domestic traveler.

Personal Construct Theory was also used in market research (Jaeger & Meiselman, 2004). In this study, the repertory grid was used to develop a framework that would measure the range of perceived conveniences for using convenience-enhanced

evening meals. The researchers admitted that there was a lack of research concerning the construct of food-related convenience. The target population for this study was female consumers and the repertory grid was used to elicit constructs for food-related convenience. The study's findings established that convenience was negatively correlated with time and effort. Correlation analysis also revealed that the degree to which the evening meal scenarios were perceived as requiring effort and time-consuming were strongly correlated. Although, the target audience was female consumers, a stated limitation was that the sample population (women with full time jobs) may have yielded different results if they had also tested stay-at-home women. Overall they anticipated that the RepGrid technique would produce the same results for two of their three research questions, if the study were to be replicated using another consumer adult population.

In 2011, Shih, Chu, Hwang, and Kinshuk conducted a study on the effectiveness of context-aware ubiquitous learning (u-learning) environments to deliver instructional content on campus vegetation. By employing the repertory grid method, the subject matter experts, students, and researchers were able to develop content for the u-learning environment. Using the RepGrid approach enabled the u-learning environment to be an expert system that guided the students' learning and assisted them in structuring their own learning. The participants were able to measure their constructs of learning according to their perceived attitudes and the effectiveness of the learning content. The effectiveness of this u-learning design was assessed with questionnaires and interviews based upon surveys of students and teachers. The end results reported that 85% of the students said the content presented in the u-learning environment was better than the face-to-face explanations. The research concluded that the u-learning approach

effectively and significantly increased students' positive learning attitudes due to the implementation of the repertory-grid method as an expert system to guide the students' learning.

CHAPTER 3. METHODOLOGY

The purpose of this study was to explore video game players' identification of video game genres, what they have learned from playing the genres, and if the different video game genres shared similar learned constructs. Researching the impact of video game playing is complex and may not be suitably examined through quantitative research techniques. Literature recommends the use of using a mixed methods approach when confronted with complex problems (J. Creswell, Clark, Gutmann, & Hanson, 2008a). The Personal Construct Theory (Kelly, 1963) used in this approach utilized focus group interviews and follow up one-to-one interviews, as well as the development and testing of a quantitative survey tool used with a larger population of the target audience. Basch (1987) has suggested that focus groups with adults are a relatively easy and flexible way to gather a diverse range of information and learn about the ideas and opinions of homogeneous groups. The quantitative portion of the PCT approach was important because it tested for similarities between the different themes.

Research Design

The Qualitative and Quantitative Paradigm

Personal Construct Theory provided the theoretical framework needed to test the different research questions in this study via a two phase approach. In allowing for emergence, the most effective strategy employed was the use of the triangulation technique for the qualitative phase of the data collection: focus group interviews followed up with one-to-one interviews. The focus group phase of data collection functioned as the

primary source of theme establishment. In the second part of the first phase, one-to-one interviews, information was collected to refine the themes and subthemes collected in the first half of phase one. This two-step data collection process supports the constructivist principle of constructivist grounded theory. This constructivist approach acknowledges that the researcher interacted with the participants, the data, and the analysis.

Research Questions

There were three main research questions in this study:

Research Question #1 (RQ1): What are the video game genres identified and defined by video game players?

Research Question #2 (RQ2): What are the learning constructs (skills, abilities, and/or dispositions) identified and defined by video game players from playing the different video game genres?

Research Question #3 (RQ3): Are there video game genres that are similar to other video game genres in terms of learning constructs?

The next section reintroduces the Personal Construct Theory. It also addresses the qualitative and quantitative components to this methodology. Lastly, the rationale for the use of mixed methods methodology and how the research questions were analyzed is addressed.

Personal Construct Theory

The exploratory nature of this study utilized a framework that identified elements and learning constructs generated from performing an activity. The theoretical framework that was chosen for this study was Kelly's PCT to study perceptions of learning (Kelly, 1963). This methodology utilizes a tool, the Repertory Grid, to identify elements, to

identify learning constructs, and to develop a survey tool to measure the degree of its effect. The Repertory Grid is an effective tool used to qualitatively measure participant identification of specific elements related to thinking and personal theorizing. Working within the framework of PCT, the research aimed to identify the perceived learning constructs that a video game player had experienced while playing the various video game genres (elements).

The first part of identifying the video game genres, or elements, was fairly straight-forward. Participants needed to discuss, identify, and define the major video game genre themes and subthemes. The next part identified the learning construct themes that they perceived to have learned from playing different video game genres. PCT examines human behavior through a constructivist manner to first identify different video game genres and general learning constructs. The next part to the study was to develop the survey tool that was used to measure the degree of each learning construct with the different video game genres. PCT was used to investigate the general understandings of a homogenous group. Kelly explained that people place their own construction of understanding according to how they interpret the environment around them (Kelly, 1963).

As mentioned before, there were several steps involved in the process of the Repertory Grid to investigate the research questions. The first step in the focus group interviews was to identify and define the elements (video game genres) to investigate the first research question. The participants were then asked to identify and define the learning constructs that occurred from playing the different video game genres. The last part of the Repertory Grid technique was to develop the survey instrument to measure the

degree of the learned construct with the video game genres. The survey instrument was tested on a larger sample to produce the quantitative results that were used to compare the different themes for similarities.

The focus group phase of data collection was the primary source of data. Phase one of PCT was used to develop the quantitative tool in which the elements and constructs were measured in a four point scale of agree and disagree. Basch (1987) has suggested that focus groups with adults are a relatively easy and flexible way to gather a diverse range of information and learn about the ideas and opinions of a homogeneous group. In the second half of the qualitative phase of the study, member checking and gathering was used in the one-to-one interviews for accuracy of results. The one-to-one interviews were conducted to obtain a deeper analysis of the focus group findings. This second phase in the data collection process supports the constructivist principles needed to maximize the richness of the Personal Construct Theory.

During the qualitative phase of one-to-one interviews, the researcher gathered narrative data and grounded conclusions for clear identification and definitions for the elements and learned constructs. This qualitative inquiry used in the one-to-one interviews also helped the researcher to clarify the definitions for each video game genre and learned construct. This type of qualitative inquiry used a flexible structure of one-to-one interviews (Bryant & Charmaz, 2010; Creswell et al., 2008; Creswell, 2008).

The researcher ensured that the collected data from the focus groups and one-to-one interviews were used to identify and define the most common video game genres and learning constructs. The follow up interviews were also used as a member check to improve accuracy and credibility of what genres were identified and defined. Member

checking was done in the interview process at the conclusion of phase one to check on the viability of the focus groups' interpretations of video game genres and learning constructs. The benefit of member checking allowed the researcher the opportunity to verify the accuracy of the findings which helped improve the validity of the findings (Creswell et al., 2008; Devers, 2011; Kelly, 1963; Kreber et al., 2003).

Rationale for Mixed Methods

The research questions in this study lend themselves to both qualitative and quantitative analysis. The mixed method research employs both qualitative and quantitative methods in the development of the theoretical framework seen in collecting, processing, and analyzing data (Huberman & Miles, 2002; Patton, 2001). Using the mixed methods approach of both qualitative and quantitative analyses, the resulting data increased the accuracy in answering the research questions (Creswell et al., 2008; Patton, 2001). The PCT is a methodology that uses the mixed method approach to identify and define elements as well as identifying and defining the perceived learning constructs from interaction with the elements. The data sets from the focus groups were then integrated to develop the quantitative portion of the study (Kelly, 1963; Kreber et al., 2003; "Understanding Personal Construct Theory - George Kelly," n.d.). The section on conceptual framework will further discuss how this study utilized the mixed methods approach in answering the research questions.

Creswell and Clark (2008) suggest that exploratory studies should utilize a mix of different methods as opposed to following only one technique. Mixed methods were used in this study to better understand this new field of research. Using a mixed methods

approach also enables triangulation of results, enhancement of results through clarification, enhancement of validity, and the expansion of breadth and range of inquiry.

Role of the Researcher

The researcher was the facilitator of both the small focus groups and the interviewer for the one-to-one interview portions of the study. According to the PCT framework, the researcher did not influence the types of elements or make any suggestions for the formulation of the elements or learning constructs. As the leader of the focus groups, the researcher constructively documented the identification and definition of the elements (video game genres) and learning constructs. Appendix A provides a list of seed questions that were used to facilitate the construction of the RepGrid. The development of the RepGrid was explained and its function in the study defined. The researcher's role was to actively facilitate the use of the theoretical framework to answer the research questions posed in this study. The method of gathering focus group data in this study was guided by the RepGrid with the knowledge that much of the terms that were identified and defined was language used by this specialized group (Huberman & Miles, 2002). The seed questions found in Appendix A were used for both focus groups to obtain group consensus on the identification and definition of video game genres (elements) and learning constructs.

The researcher also took careful notes in the second half of the qualitative study during the one-to-one interviews. The researcher developed follow-up questions to ensure clarity. The interviewer asked predetermined questions (see Appendix B) related to the first two research questions, while using the time to correctly develop the survey tool for the second quantitative phase of the study.

The researcher interacted with each participant in both stages (focus group and one-to-one interviews) of the qualitative portion of the study. In summary, the researcher conducted two focus group interviews followed by two one-to-one interviews. The researcher and several members of the dissertation committee determined that there would be no need for further group interviews because the data collected from the two sets of focus groups and two rounds of follow up interviews were enough to answer the research questions of this study. As a form of inter-rater reliability, the results from the focus groups and interviews were discussed and the researcher consulted with colleagues of various theoretical backgrounds to ensure accuracy of the results.

With the results from the phase one interviews, the RepGrid was used to develop the survey tool for the quantitative portion of the study. In this phase, the researcher sent out the developed survey tool to the rest of the target population. The target population was the same group of video game players who were part of a University's registered independent organizations. The participants in this organization were chosen based on the fact that the participants were adults, educated, members of the gaming community, and part of a system of higher education. The results from the degrees to which each learning construct relates to a video game genre was measured and then observed for similarities between each genre. With those observations, the third research question was answered.

Participants and Context

Participants

Eight undergraduate and graduate students (18-30 years old) attending a Research I University were interviewed in the focus group phase of the study. The students were affiliated with a video game playing club and officially recognized by the University

system as a registered independent organization. The school is a public institution of higher education and the school is classified as a Research I university on the Carnegie Classification of Institutions.

As recommended for qualitative research (Daniel, 2011; Merriam, 2009), the researcher employed purposive sampling in which participants were chosen based on certain criteria. Theoretical sampling of this particular set of subjects was chosen based on theoretical categories which provided a certain polar type (Eisenhardt, 1989). Rather than using a sampling of the general populous, the researcher utilized purposive sampling because of the participants' knowledge, experience, and expertise as members of a specific target population. The eight participants took part in one of two focus groups with four participants per group. Of the participants, only one individual was female while the rest of the participants were male. Of the two focus groups, one individual from each group was later asked to participate in the one-to-one interview portion of the study.

For the second phase of the study, a total of 42 participants completed the survey. Of those participants, 37 were male and 5 were female. The demographic survey results are included in Appendix C. The general information was collected to help with discussion topics addressed in the analysis part of the study. Some demographic data were also reported in the results section of this study and highlights some of the relevant information on gaming from the target population.

To ensure proper ethical treatment of the study of human subjects, the Human Study Committee officially approved the research in July of 2013. This study will keep participant information confidential, but it does not guarantee anonymity due to the

sample size. Information kept on the participants will not be kept longer than six months from the completion of the study, in which all data will be destroyed.

Study Setting

The first half of the study (the qualitative portion) took place at a public University during Fall 2013 and Spring 2014. The Research I University is in the United States. The focus group and interviews occurred in a small conference room at the University. The second half of the study was made available online. The survey tool was administered over the Internet, and participants took the survey wherever and whenever they chose to take it granted that they were using a computing device connected to the internet.

Instrumentation

Materials that were used in this study included a small meeting room, laptop, digital audio recorder, whiteboard, digital still camera, interview question sheets (see Appendix A and B), a demographic survey, and RepGrid template (See Appendix D). The small meeting room was a conference room provided by the University for group meetings. The digital camera was used to capture notes written on the whiteboard during the focus group interviews. The digital audio recording device was used to record the discussions that occurred in the focus group and one-to-one interviews. Microsoft Excel was used to calculate the statistics needed for the comparative analytics of the data.

Data Collection

The data collection process took five months to complete. The first month was used to collect the focus group data and the following month was used for the one-to-one

interviews. Each of the two focus group interviews took three hours to conduct and was scheduled two weeks apart from each other. The two follow up one-to-one interviews took about an hour and a half each, and helped to clarify and validate focus group results. In the third month, the RepGrid tool was used to create the survey tool. Once the survey tool was developed, the survey was available online for three weeks of the fourth month. In the last month, the researcher inputted the data and compiled it into a spreadsheet for analysis.

The demographic survey was developed to examine video gaming characteristics, video gaming preferences, and personal interests in playing video games. The average time for a participant to complete the online demographic section was about five minutes and the general survey took about another 20 minutes to complete.

Table 4 below illustrates how the three research questions aligned with the methodology, measurement tool, and data collection results used to answer the research questions.

Table 4. Research Questions and the Data Collection Process

Phase One	Question	Participant	Methods	Tools	Data
RQ1.	What are the video game genres identified and defined by video game players?	Small Group; One-on-One interviews	Personal Construct Theory; Content Analysis	RepGrid	Qualitative: identification and definition of video game genres
RQ2.	What are the learning constructs (skills, abilities, and/or dispositions) identified and defined by video game players from playing the different video game genres?	Small Group; One-on-One interviews	Personal Construct Theory	RepGrid	Qualitative: identification and definition of learning constructs
Phase Two	**Question**	**Participant**	**Methods**	**Tools**	**Data**
RQ3.	Are there video game genres that are similar to other video game genres in terms of learning constructs?	Sample Population (n=42) of target population	Personal Construct Theory	RepGrid developed survey tool	Quantitative: comparative report on statistical analytics of the survey results

Data Analysis

This study collected information that discovered different themes in video game genres. It also served to identify and define learning constructs acquired from playing video game genres. In the next chapter, the data collected will be presented and the processes of discovering the themes described.

Utilizing the PCT framework for analysis

The first phase of the qualitative data set was used to identify and define the video game genres. The importance of identifying video game genres stems from the lack of

research literature on video game genres. With this study, the research has added to the new topic of video game genre studies.

The second set of data reported was the identification and definitions of learning constructs acquired from playing video games. The importance of identifying learning constructs from playing video game genres is that it is a new type of study in a fairly new research field of video game studies. This exploratory study will hopefully be a foundation for future video game genre research.

Initial analysis

Because PCT has been successful in other exploratory studies, this study utilized PCT to answer the research questions on identifying and defining the different video game genres, identifying and defining the learning constructs generated from each video game genre, and lastly comparing the different video game genres to each other in terms of learning constructs. In a more detailed look, the qualitative and quantitative approaches of the RepGrid were used to examine the research questions.

For research question number 1: What are the video game genres identified and defined by video game players? The RepGrid was used to draw out the participants' identification and definition of the elements. The theme was video game genres and the element or subtheme was a video game genre. The researcher asked for consensus of each identified element so that all of the major video game genres were recorded. Along with identifying each element, each group was asked to define each element. Examples of some of the elements were real-time strategy, puzzle, sports, and first-person shooters. Specific video game titles were not included as elements, but were recorded as examples that could be used in the survey tool. Along with using the RepGrid tool to identify the

elements for the first research question, the researcher also facilitated for group effect to capture the best results possible (Carey & Smith, 1994; Kelly, 1963). In the analysis portion of the elements (video game genres), the identified elements were compared to the game genres identified from the literature review. The comparative analysis of previous research with the results from this current study is known as content analysis (Weber, 1990). This is an important step in validating the study since reports from other studies were compared to this study to ensure that the number of elements were appropriately identified and defined.

The number of identified elements were different than previous numbers, thus there was discussion about why the numbers were different from other reports. Since the participants represented in the study were a highly specialized group of individuals, these individuals were perceived to have some expertise in video game playing which produced rich data that answered the first research question.

The second research question in the study was: What are the learning constructs (skills, abilities, and/or dispositions) identified and defined by video game players from playing the different video game genres? The RepGrid was used to draw out the participants' identification and definition of the learning constructs from playing the different video game genres. The identification of the elements used in the RepGrid were utilized to determine what the participants had learned from playing the different video game genres. Learning constructs were then defined. Once again, the identification of the learning concepts was derived from the same highly specialized group of individuals. Their identification and definitions for each learning concept is interpreted as expert opinion. Thus, research question number two was answered.

Upon the development and completion of the RepGrid in the focus group stage, follow up interviews were conducted to better understand the data collected from the RepGrid. Upon preliminary data results, a semi-structured interview guide (see Appendix B) was used to ensure accuracy and validity found in the focus group results.

Higher level analysis

The third and final research question for the study was: Are there video game genres that are similar to other video game genres in terms of learning constructs? The developed survey tool, RepGrid, was used to answer the last research question. Once the learning constructs were identified and defined, each learning construct was entered into a grid form which measured the weight of the learned construct against each video game genre. For each learning construct, a Likert 4-point scale rating measured the degree to which the construct was learned or not learned for each of the video game genres. This scale measured if the participant 1- agreed, 2 - somewhat agreed, 3 - somewhat disagreed, or 4 - disagreed to having learned the listed construct. A scaled choice of 5 - not applicable was added to determine if a learned construct was not applicable to the video game genre.

A survey question sample template is presented in Table 5. Excel was used to determine whether there were similarities between each of the video game genres in terms of the learning constructs. The combination of percentages for the agree and somewhat agree participants were added and observed for values of 50% or greater.

Table 5: Illustrative example of sample matrix grid for video game genres and learning.

Learning Construct Number 1

	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
Video Game Genre 1	1	2	3	4	5
Video Game Genre 2	1	2	3	4	5
Video Game Genre 3	1	2	3	4	5
Video Game Genre 4	1	2	3	4	5

Learning Construct Number 2

	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
Video Game Genre 1	1	2	3	4	5
Video Game Genre 2	1	2	3	4	5
Video Game Genre 3	1	2	3	4	5
Video Game Genre 4	1	2	3	4	5

Table 6 (see below) is an example of the individualized rating scale for the coding learning construct. It is measured against each video game genre for the participant to rate. The results measured each participant's perception on whether they learned the coding learning construct. The scale item 0 is available because it was anticipated that some learning constructs were not applicable to some video game genres.

Table 6: Illustrative example of a repertory grid for a single element and its learning constructs.

Learning Construct: Coding

I learned how to code and/or program source code from playing the following video game genres.

	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
RPG	1	2	3	4	5
MMORPG	1	2	3	4	5
FPS	1	2	3	4	5
Sports	1	2	3	4	5
Puzzle	1	2	3	4	5
RTS	1	2	3	4	5
Action	1	2	3	4	5
Turn Based	1	2	3	4	5
Simulation	1	2	3	4	5
Fighting	1	2	3	4	5
Kinetic Controlled	1	2	3	4	5
Casual	1	2	3	4	5

Personal Construct Theory utilized analytics that compared the different elements to each other in terms of the different learning constructs. With the data collected in this quantitative phase, the researcher analyzed themes, and then discussed the themes in terms of the research questions in the last chapter. A completed individual RepGrid example for the conflict management learning construct coupled with the video game genres are displayed in Table 7. The values listed under each column was the number of participants who chose that degree value. The quantitative nature of this data provided the values needed to calculate the percent of participants who chose the agree values versus

the disagree values. The percent of agreement values were analyzed and used to determine which video game genres were similar in teaching a learning construct.

Table 7: Illustrative example of all responses for the Repertory Grid for the conflict management construct.

Learning Construct: Conflict Management

I learned conflict management from playing the following video game genres.

	Strongly Agree	Agree	Disagree	Strongly Disagree	Not Applicable
RPG	14	15	2	9	2
MMORPG	18	8	3	7	6
FPS	11	13	2	12	4
Sports	3	9	2	15	13
Puzzle	5	10	5	13	9
RTS	10	13	2	11	6
Action	8	10	3	14	4
Turn Based	10	14	2	12	4
Simulation	12	13	2	10	5
Fighting	5	3	9	16	9
Kinetic Controlled	4	3	4	14	17
Casual	1	8	6	15	12

The level of analysis for the third and final research question used a considerably higher level of analysis because of the complex set of themes developed from the RepGrid. The themes for the genres and learning constructs were used in the framework to verify which genres were teaching which learning constructs. The major ideas that are presented are important to the conclusions made in the last chapter because the data presented and discussed suggest that educators could actually use this study's results to optimize their curriculum. The conceptual framework used in this study has produced a tool that is essentially very helpful for educators looking into video games and learning.

Verification

The RepGrid tool helped the researcher answer the research questions posed in this study. The tool has been developed and adapted in many different ways to examine different personal constructs in various fields. The Personal Construct Theory and the RepGrid instrument guarantees objectivity and reproducibility of the results as well as a valid tool used for exploratory studies (Fromm, 2004).

Personal Construct Theory was the theoretical framework used to answer the research questions. The theoretical framework was a combination of qualitative and quantitative design, which created a higher level of accuracy in the results. The data collected for the first two research questions were member checked and triangulated by using follow up interviews to ensure accurate data.

Because traditional scientific methods cannot easily answer exploratory study research questions, the PCT mixed methods approach was used. The strategy for increasing validity of evaluation and research in this study was addressed with the use of the RepGrid instrument. The instrument provides multiple means of exploring new elements and constructs.

CHAPTER 4. DATA COLLECTION

Chapter 4 explores the development of a quantitative research tool that identifies elements and learning constructs from the perspectives of video game players on the topic of video game genres. This chapter looks at common themes that were developed with the purpose of identifying video game genres (elements) and learning constructs that occurred when playing video games, and testing the relationships between these two points. The main purpose was to see if there was a relationship between playing video games and learning. To address this purpose, the researcher used the Repertory Grid, a tool used in Personal Construct Theory, which utilized a two-step (qualitative then quantitative) process. The first step involved using qualitative data that was collected from focus groups and one-to-one interviews to formulate the first set of themes. The second step quantified relationships among data collected to observe similarities among identified video game genres and learning construct occurrences.

Theme: Video Game Genres

Video game genres are defined as video games characterized by similarities in style, content, and gameplay. The researcher developed a number of questions for the focus groups (refer to Appendix A) to help identify and define the different video game genres present in this study. The two focus groups filled out the basic RepGrid template as seen in Appendix D (Kelly, 1963).

The results were collected using the RepGrid approach. In this RepGrid approach, participants were asked to identify and define what video game genres were present in the

study. As a result, each of the two groups listed and defined several video game genres that were categorized according to a subtheme. There were twelve video game subthemes developed. The first eight were developed with full consensus from the focus groups and the interviewees. The last four were developed with the consensus of at least one focus group and the interviewees.

Subthemes: RPG, MMORPG, FPS, Sports, Puzzle, RTS, Action, and Turn-Based

Following is a description of the genres that were identified by the first focus group. The first group identified thirteen video game genres. The genres that were identified were role-playing games (RPG), massively multiplayer online role-playing games (MMORPG), first-person shooters (FPS), sports, puzzle, real-time strategy (RTS), action, adventure, turn-based, simulation, fighting, racing, and creation. The second group identified thirteen video game genres: role-playing games (RPG), massively multiplayer online role-playing games (MMORPG), first-person shooter (FPS), sports, puzzle, real-time strategy (RTS), action, turn-based, casual, exercise, music, horror, and online board games. There were eight video game genres that both groups identified. Those eight video game genres were RPG, MMORPG, FPS, sports, puzzle, RTS, action, and turn-based.

Both groups did not unanimously select the same genres. Group 1 identified simulation, fighting, adventure, racing, and creation as other video game genres whereas Group 2 identified casual, exercise, music, horror, and online board games. There were a total of ten extra video game genres. The RepGrid technique utilized follow up interviews to clarify if those extra video game genres were indeed elements that needed to be

included in this study. The follow up interviews were conducted after both of the focus groups' data was collected.

The two follow up interviews confirmed that the eight video game genres supported by focus Groups 1 and 2 were authentic. This provided the first set of video game genre themes. These subthemes were supported by the focus groups and interviews. The subthemes were RPG, MMORPG, FPS, sports, puzzle, RTS, action, and turn-based. All participants in the RepGrid qualitative process supported the inclusion of these video game genres in the study.

Subthemes: Simulation, Fighting, Casual, and Kinetic-controlled

On the other hand, there were ten extra video game genres that were identified by at least one of the focus groups that were confirmed during the one-to-one interviews. There were three video game genres that were named by at least one group and both one-to-one interviews. Those included simulation, fighting, and casual. The last video game genre that was supported by interviewees and added to the list of video game genres was kinetic-controlled. This genre was created because the interviewees felt that the extra video game genres identified by Group 2—exercise and music,—could also be classified as kinetic-controlled video games.

Genres that were also excluded were adventure, creation, racing, horror, and online board games. Generally speaking, the interviewees said that those genres could be considered subgenres. The interviewees reported the following: adventure games could be classified as action games; creation and racing could be classified as simulation; and online board games could be classified under turn-based games. Overall, the participants were very comfortable with the final list of video game genres. Figure 1 shows the

process of determining the theme of video game genres for this study. The subthemes in the red box are the elements that were used in this study, too.

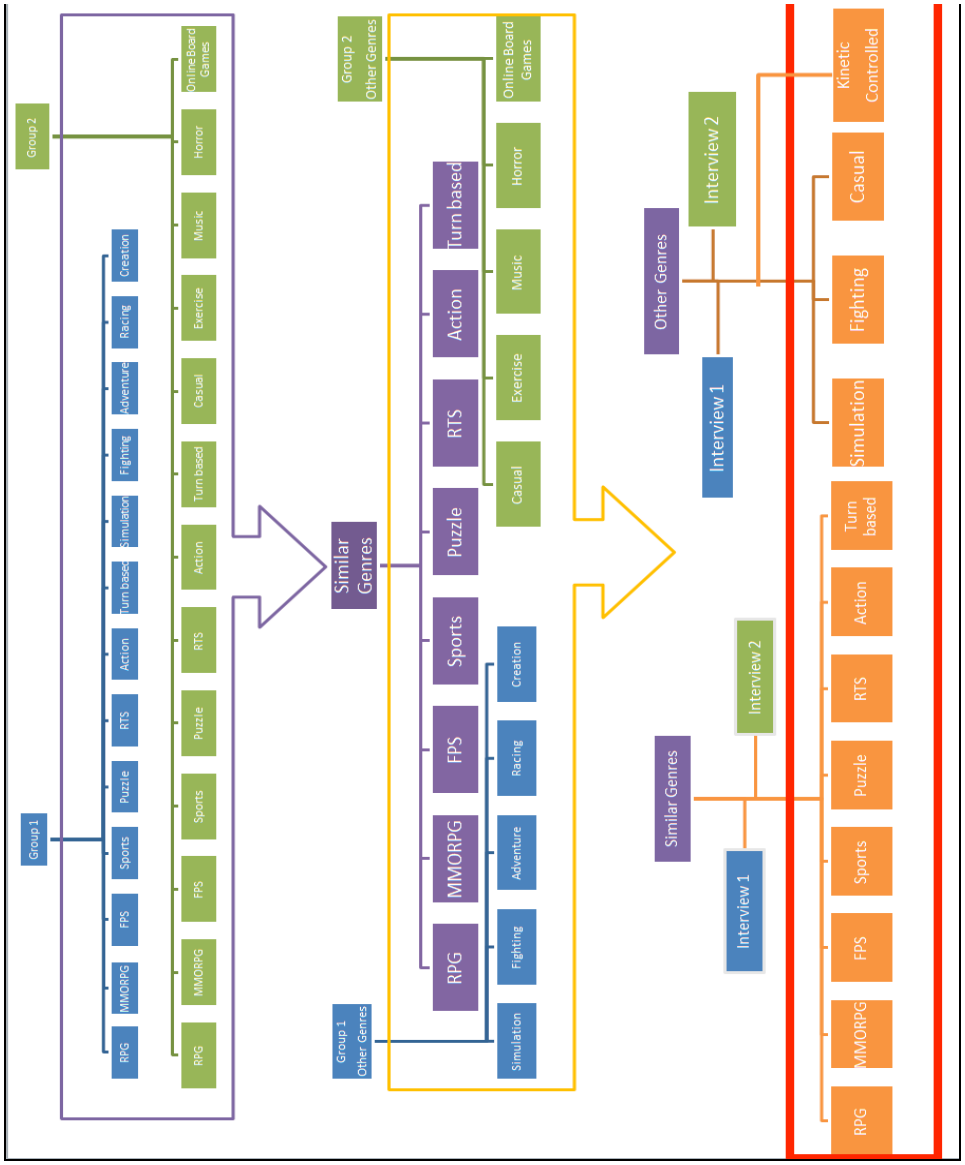


Figure 1. **Qualitative process for selecting video game genres. The subthemes are inside of the red box.**

Thus, the total number of video game genres recorded was twelve. These were the subthemes that were discovered under the main theme of video game genres. This research study is one of the first to use data to identify different video game genres using

the RepGrid technique. The significance of these findings is that video game genre classifications have typically not been identified in past studies.

Table 8 identifies and defines the different video game genres used in this study. The last column was added to help clarify the types of video games within each genre that the participants evaluated.

Table 8. Identified video game genres, definitions, and examples.

Video Game Genre	Definition	Examples
Role-playing games (RPG)	A game in which players take on the role of a hero or character who engages in a story-driven adventure.	*Final Fantasy, Knights of the Old Republic, Mass Effect, Dragon Age*
Massively multiplayer online RPG (MMORPG)	Online role-playing games (RPG) that allow large amounts of gamers to interact with each other in an evolving virtual world simultaneously via the internet.	*World of Warcraft, EVE Online, DC Universe Online*
First-person shooter games (FPS)	Video game genre centered on a weapon-based combat through a first-person perspective.	*Counter Strike, Battlefield, Call of Duty*
Sports games	Video game genre that simulates the practice and play of any traditional sport.	*FIFA Soccer, Madden NFL, NBA 2K*
Puzzle games	Video games that emphasizes puzzle solving.	*Bejeweled, Tetris, Solitaire*

Real-time strategy (RTS)	Time-based video game genre that centers around resource and building management. This genre typically involves city building and war management themes.	*Starcraft, Age of Empires, Warcraft*
Action games	Video game genre that emphasizes rapid action and quick reflexes.	*Grand Theft Auto, Ratchet and Clank, Super Mario Bros.*
Turn-based games	Video games that involve a mix of strategy and tactics to beat opponents, in a pattern of taking turns.	*X-COM, MUD, Final Fantasy Tactics, Shining Force, Monopoly*
Simulation games	Video games that seek to replicate real world situations, physics, and events.	*The Sims, Ace Combat, Gran Turismo, Rollercoaster Tycoon*
Fighting games	Video game genre which one video game player battles another (artificially controlled and/or player controlled) character.	*Super Smash Bros., Street Fighter, Marvel vs. Capcom, Tekken*
Kinetic-controlled games	Video games that utilizes a player's actual physical movements to actively control an in-game character or event. These games require a peripheral device that reads a player's movement to interact with the game's mechanics.	*Rock Band, Just Dance, Championship Sports*

Casual games	Games with simple rules that may be played with no complex time commitment or learning curve required. Meant to be able to be picked up and played by any average person.	*Pac-Man, Pinball, FarmVille, Plants vs. Zombies,* PopCap Games

Theme: Learning Constructs

A learning construct is what a video game player identifies as a skill, ability, or disposition that has been learned from playing any video game genre. The researcher developed a number of questions for the focus groups (refer to Appendix A) to help identify and define what learning constructs were present. The RepGrid template was once again used for the focus groups to fill out. This study identified multiple important consensuses on the theme of learning constructs.

The results were collected using the RepGrid approach. In this RepGrid approach, participants were asked to identify and define the learning constructs they used from playing the video game genres they identified. Using the questions that were developed for the focus groups and using the RepGrid template, each of the two groups listed and defined different learning constructs. Each group was asked to look at the video game genres that they identified and then identify the learning constructs experienced from playing the video game genres.

Group 1 identified thirteen learning constructs. These learning constructs were coding/computer programming, conflict management, communication skills, creating a community, crafting, critical thinking, attention to detail building management, hand-eye coordination, how to be competitive, interpersonal skills, map awareness, and conduct

research. Group 2 identified seventeen learning constructs. These constructs were identified as conflict management, communication skills, crafting, critical thinking, attention to detail building management, hand-eye coordination, how to be competitive, interpersonal skills, map awareness, conduct research, economics, reading comprehension, resource management, strategy, spatial thinking, and time management. There were eleven learning constructs identified in common between both groups. Those learning constructs were conflict management, communication skills, crafting, critical thinking, attention to detail building management, hand-eye coordination, how to be competitive, interpersonal skills, map awareness, and conduct research.

There were learning constructs not unanimously selected by both groups. Group 1 identified two more constructs: coding/computer programming and creating a community. Group 2 identified six more learning constructs: economics, reading comprehension, resource management, strategy, spatial thinking, and time management. The entire list of learning constructs were combined according to the RepGrid technique. In turn, the one-to-one interviews clarified, edited, and approved the list of learning constructs.

During two follow up interviews, the researcher confirmed that the eleven learning constructs identified by both groups were valid learning constructs. By reaching unanimous consensus, these subthemes were accurate findings since both focus groups and interviews validated them. A consensus was reached by participants using the qualitative step of the RepGrid regarding the first set of learning constructs identified in this study.

To reach the next set of subthemes, the interviewees were given the list that both groups indicated as learning constructs. They all supported the eleven learning constructs identified by both groups. Each participant was then asked to support, reject, or edit the other learning constructs supported by at least one of the groups. Both interviewees felt that what each group identified should be supported, since the combination of both focus group learning constructs were a comprehensive and accurate list of what had been learned from playing video game genres. Table 9 shows the learning constructs, who identified each genre, and who supported it.

Table 9. Comprehensive list of learning constructs and by whom it was supported.

LC#	Learning Construct (Subthemes)	Group 1	Group2	Interview 1	Interview 2
LC01	Coding/computer programming	Identified and Supported		Supported	Supported
LC02	Conflict Management	Identified and Supported	Identified and Supported	Supported	Supported
LC03	Communication Skills	Identified and Supported	Identified and Supported	Supported	Supported
LC04	Creating a Community	Identified and Supported		Supported	Supported
LC05	Crafting	Identified and Supported	Identified and Supported	Supported	Supported
LC06	Critical thinking	Identified and Supported	Identified and Supported	Supported	Supported
LC07	Attention to detail	Identified and Supported	Identified and Supported	Supported	Supported
LC08	Building management	Identified and Supported	Identified and Supported	Supported	Supported
LC09	Hand-eye coordination	Identified and Supported	Identified and Supported	Supported	Supported
LC10	How to be competitive	Identified and Supported	Identified and Supported	Supported	Supported

LC11	Interpersonal skills	Identified and Supported	Identified and Supported	Supported	Supported
LC12	Map awareness	Identified and Supported	Identified and Supported	Supported	Supported
LC13	Conduct research	Identified and Supported	Identified and Supported	Supported	Supported
LC14	Economics		Identified and Supported	Supported	Supported
LC15	Reading comprehension		Identified and Supported	Supported	Supported
LC16	Resource management		Identified and Supported	Supported	Supported
LC17	Strategy		Identified and Supported	Supported	Supported
LC18	Spatial thinking		Identified and Supported	Supported	Supported
LC19	Time management		Identified and Supported	Supported	Supported

Learning Construct Subthemes

Table 10 shows the comprehensive list of all learning constructs. The theme of learning constructs had nineteen subthemes. The subthemes are highlighted in the table under the heading of Learning Construct. There were eleven learning constructs that were supported by the focus groups and interviews. Those included conflict management, communication skills, crafting, critical thinking, attention to detail building management, hand-eye coordination, how to be competitive, interpersonal skills, map awareness, and conduct research. There were eight other learning constructs supported by at least one of the groups and both interviews. Those included coding/computer programming, creating a community, economics, reading comprehension, resource management, strategy, spatial thinking, and time management. The comprehensive list of nineteen learning constructs compiled from this study is a first attempt at identifying what people are learning from

playing different video games. Its significance to the current body of video game research is that this study is classifying different learning constructs not done before by other researchers.

Table 10. Comprehensive list of learning constructs and by whom it was supported.

LC#	Learning Construct	Definition
LC01	Coding/computer programming	is the process of editing or writing source code to modify gameplay in a video game.
LC02	Conflict Management	is the process of limiting the negative aspects of conflict. This process includes dealing with disputes in a rational, effective, and fair manner. The aim of conflict management in a video game environment usually involves problem resolving abilities and good negotiating skills to resolve conflict within a game or between real life players.
LC03	Communication Skills	is the ability to convey information to another person or a group of people.
LC04	Creating a Community	is the process of developing and/or maintaining a small group of individuals to start conversations around specific tasks, hobbies, interests, organizations, or a video game.
LC05	Crafting	is the method to which a video game player learns to produce items (blocks, tools, materials, armor, etc.) for game use or trade.
LC06	Critical thinking	is the method to which a video game player learns to reason at a high level of thought.
LC07	Attention to detail	is the method to which a video game player learns to concentrate on the important details necessary to completing or accomplishing different tasks.
LC08	Building management	is the method to which a video game player learns to develop certain structures and processes in order to create products necessary for economical success or growth.

LC09	Hand-eye coordination	is the coordinated control of eye movement with hand movement as part of completing everyday tasks.
LC10	How to be competitive	is the practice and use of learned strategies that a video game player utilizes to achieve success against others.
LC11	Interpersonal skills	are life and social skills used daily to effectively communicate and interact with others.
LC12	Map awareness	is the ability to learn and decipher a map's terrain or environment while always knowing your own position. Map awareness also allows you to take advantage of certain positions on a map to maximize task success.
LC13	Conduct research	is the ability to search for different resources to learn more about a certain topic to achieve success.
LC14	Economics	is the social science that studies the behavior of individuals, groups, and organizations in relation to how they manage, use, and understand scarce resources to achieve desired ends.
LC15	Reading comprehension	is the act of understanding what you are reading. It is an active and intentional process that occurs during and after reading a particular piece of writing or text.
LC16	Resource management	is the ability to efficiently and effectively deploy and manage resources to maximize success.
LC17	Strategy	is the ability to create a plan designed to achieve a goal.
LC18	Spatial thinking	is the ability to record information about one's environment and its spatial orientation.
LC19	Time management	is the act or process of planning and exercising conscious control over the amount of time spent on specific activities to effectively and efficiently complete tasks.

Quantitative Results for RepGrid

Once the elements and learning constructs were identified, they were put into the final RepGrid tool— a completed survey tool. The survey tool was disseminated and administered via an online Google form. There were two parts to the online survey tool. The first were the results from the demographic portion of the survey and the second was the data collected from the RepGrid tool used to examine the theme of video game genres and learning.

Demographic Survey Results

There was a total of forty-two participants (n=42). Of those 42 participants, 37 of them were male and the other 5 were female. A third of the participants were at least 18-21 years old, with 61% of the participants were within the age range of 18-30. In terms of education, 60% were considered to be undergraduates, 19% had Bachelor's degrees, and 17% had Master's degrees.

Figure 2 shows the results of the video gaming platforms the participants were using. Please note that the percentages when added together were greater than 100% because participants could have played on multiple video gaming systems. The results indicated that 85% used a computer for gaming, 50% played on a Sony PlayStation, 50% played on a Smartphone, and 42% played on the Microsoft Xbox.

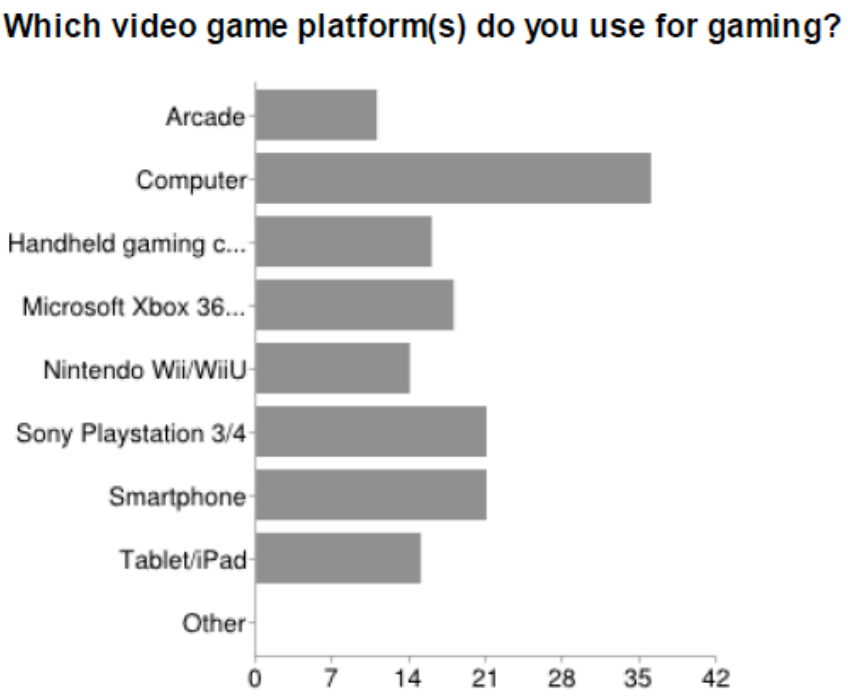


Figure 2. **Results for which video game platform do you play.**

Half the participants assessed themselves as a "gamer" and almost of fifth of them considered themselves to be a "hardcore gamer." Fifteen was the average number of years the participants had been playing video games. When asked about purchasing video games, 29% reported waiting for video games to go on sale, 21% reported buying games on their release date, 17% purchased games while the games were fairly new, and 14% of them played free-to-play games. When asked if they considered themselves a video game developer, 60% of them said they were not, 7% said they were, 12% have tried to develop games, and 21% had not developed a video game before but were interested in doing so. The last demographic survey question asked about employment, in which 52% had a full time job and 33% were full time students.

The last two demographic questions asked about the social aspects of playing video games. In Figure 3, participants were asked what gameplay they preferred and if had they made friends through playing video games. As for gameplay, playing individually (33%) was ranked highest, but was closely followed by team-based (29%) and massively multiplayer (31%). When asked about their social friendships, half reported socializing with friends in game and in real life. The second highest rank was socializing in game only (31%), while the last 20% answered that they did not make friends through playing video games.

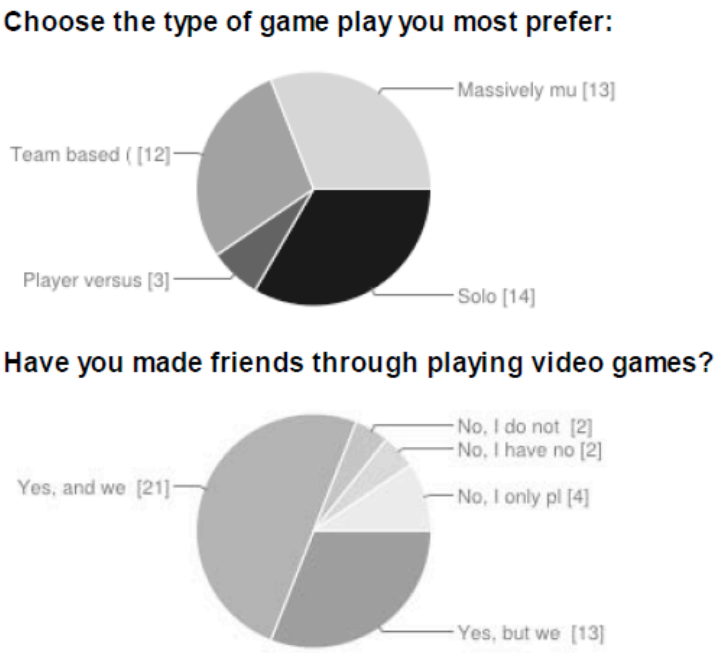


***Figure 3*. Demographic results when asked about the social aspects of playing video games.**

Survey Tool Results

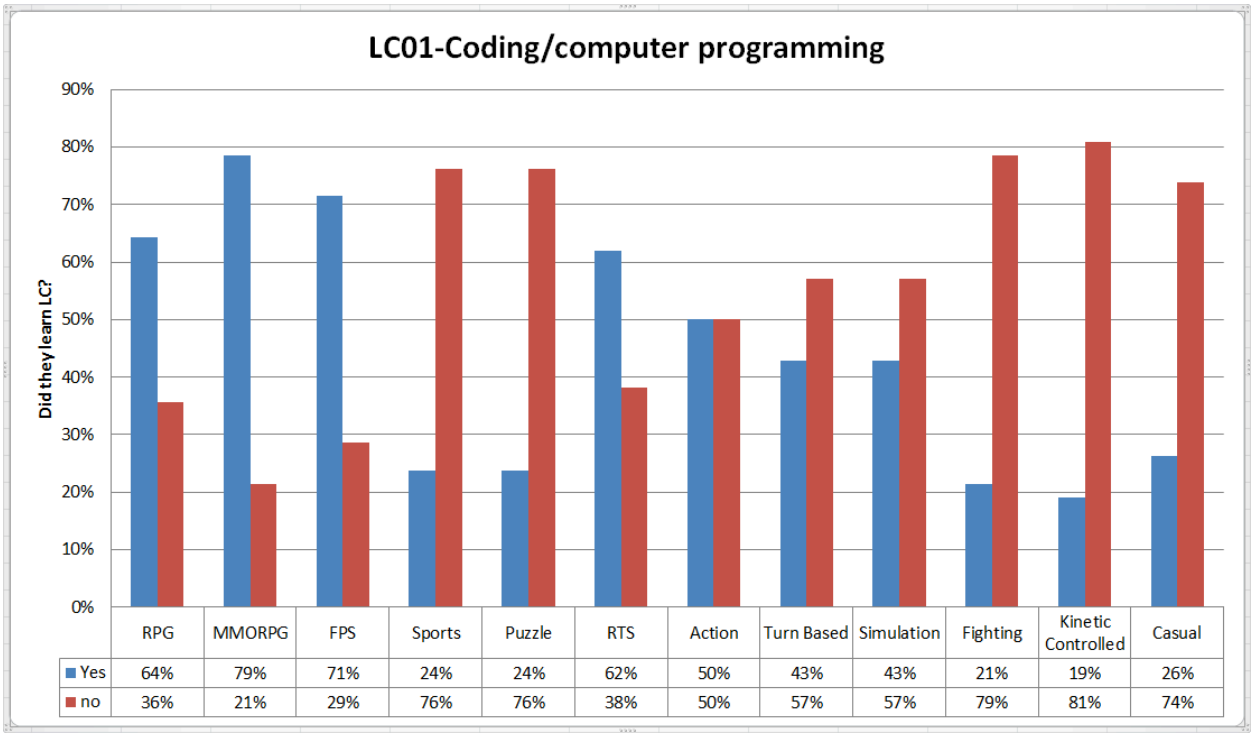
The data collected in this section provided the framework for analysis of what learning constructs were associated with particular video game genres. The results from the survey are used in the next chapter to analyze which video game genres could be used

to teach a learning construct. The nineteen learning constructs are displayed in the following figures with brief summaries. The researcher highlighted the agreed to learning the construct responses in the narrative. For each survey item, the bar graph shows the Yes response for agree and No response for disagree. Each subtheme of learning constructs was compared to all the subthemes of video game genres. Using the RepGrid template, each genre was placed into a scale according to learning constructs. The following narratives identified and defined the subtheme with a report on which video game genres taught a learning construct.

Coding/computer programming

Coding/computer programming was the first subtheme identified in the qualitative part of the study. The participants defined coding/computer programming as "the process of editing or writing source code to modify gameplay in a video game." An example would be a participant going into the source code and editing it to modify gameplay. Once the coding/computer programming subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Figure 4 shows the results for the coding/computer programming learning construct with the responses for all video game genres. According to the parameters set by the researcher (a score of 50% or more), none of the video game genres taught the learning construct coding/computer programming.



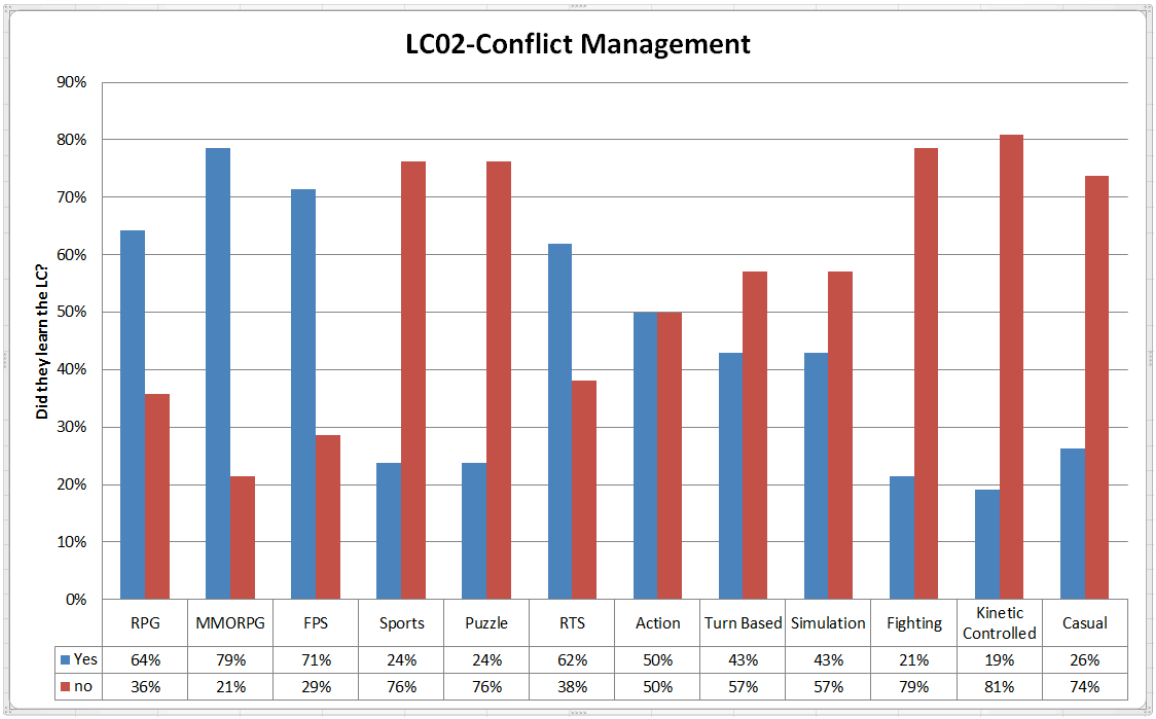
	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	64%	79%	71%	24%	24%	62%	50%	43%	43%	21%	19%	26%
no	36%	21%	29%	76%	76%	38%	50%	57%	57%	79%	81%	74%

***Figure 4*. Bar graph results for coding/computer programming learning construct compared to each video game genre.**

Conflict management

Conflict management was the second subtheme identified in the qualitative part of the study. The participants defined conflict management as "the process of limiting the negative aspects of conflict. This process includes dealing with disputes in a rational, effective, and fair way. The aim of conflict management in a video game environment usually involves problem resolving abilities and good negotiating skills to resolve conflict within a game or between real life players." An example might include gamers figuring out who in their group would receive a special loot item after conquering a level or creature. Once the conflict management subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Figure 5 shows the results for the conflict management learning construct with the responses for all video game genres. About 82% of the participants felt that the learning concept of conflict management was learned from playing several of the video game genres. Of those getting the highest ratings MMORPG had the highest at 79% followed by FPS at 71%, RPG at 64%, RTS at 62%, and action at 50%.



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	64%	79%	71%	24%	24%	62%	50%	43%	43%	21%	19%	26%
no	36%	21%	29%	76%	76%	38%	50%	57%	57%	79%	81%	74%

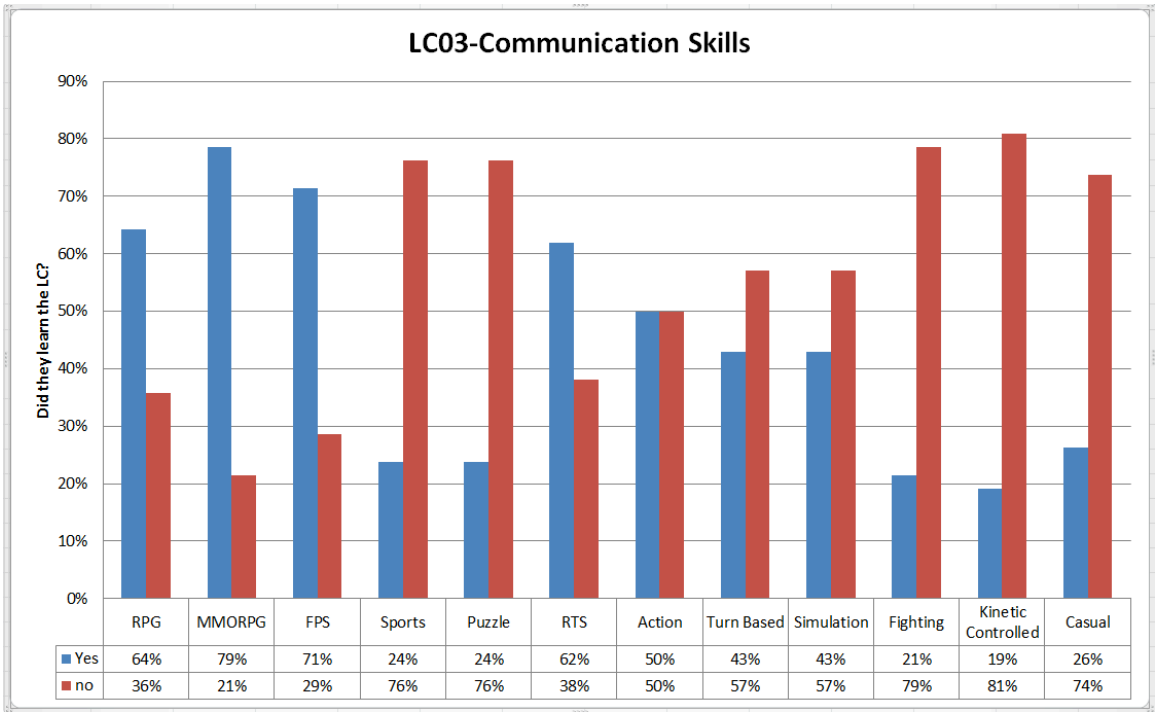
***Figure 5*. Bar graph results for conflict management learning construct compared to each video game genre.**

Communication skills

Communication skills were the third subtheme identified in the qualitative part of the study. The participants defined communication skills as "the ability to convey information to another person or a group of people." An example would be all players in an FPS game must be able to clearly communicate what each player's roles are to make sure the in-game objectives are reached. Once the communication skills subtheme was

entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Figure 6 shows the results for the communication skills learning construct with the responses for all video game genres. The participants felt that they learned the communication skills construct from five of the genres. The genres from highest to lowest ratings are MMORPG, FPS, RPG, RTS, and action. The ratings were as follows: 79% agreed to learning it from MMORPG, 71% agreed to learning it from FPS, 64% agreed to learning it from RPG, 62% agreed to learning it from RTS, and 50% agreed to learning it from action.



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	64%	79%	71%	24%	24%	62%	50%	43%	43%	21%	19%	26%
no	36%	21%	29%	76%	76%	38%	50%	57%	57%	79%	81%	74%

***Figure 6*. Bar graph results for communication skills learning construct compared to each video game genre.**

Creating a community

Creating a community was the fourth subtheme identified in the qualitative part of the study. The participants defined creating a community as "the process of developing

and/or maintaining a small group of individuals to start conversations around specific tasks, hobbies, interests, organizations, or a video game." An example would be starting or joining a guild or clan for any gamer to play and socialize with other gamers. Once the creating a community subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Figure 7 shows the results for creating a community learning construct with respect to all video game genres. The participants felt that they learned to create a community from playing four of the genres. These four genres were MMORPG, FPS, RPG, and RTS. The ratings were as follows: MMORPG and FPS both reported 79% agreed rating for creating communities. The results also reported that 52% agreed to learn it from RPG, and 50% agreed to learning it from RTS.

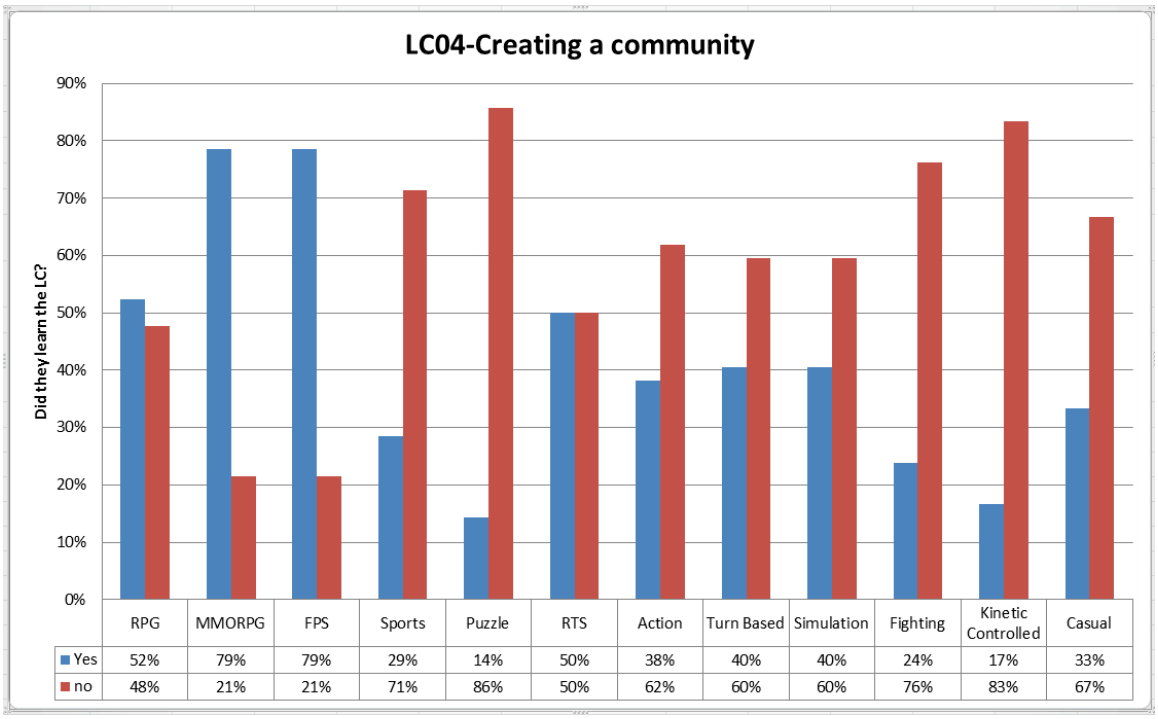


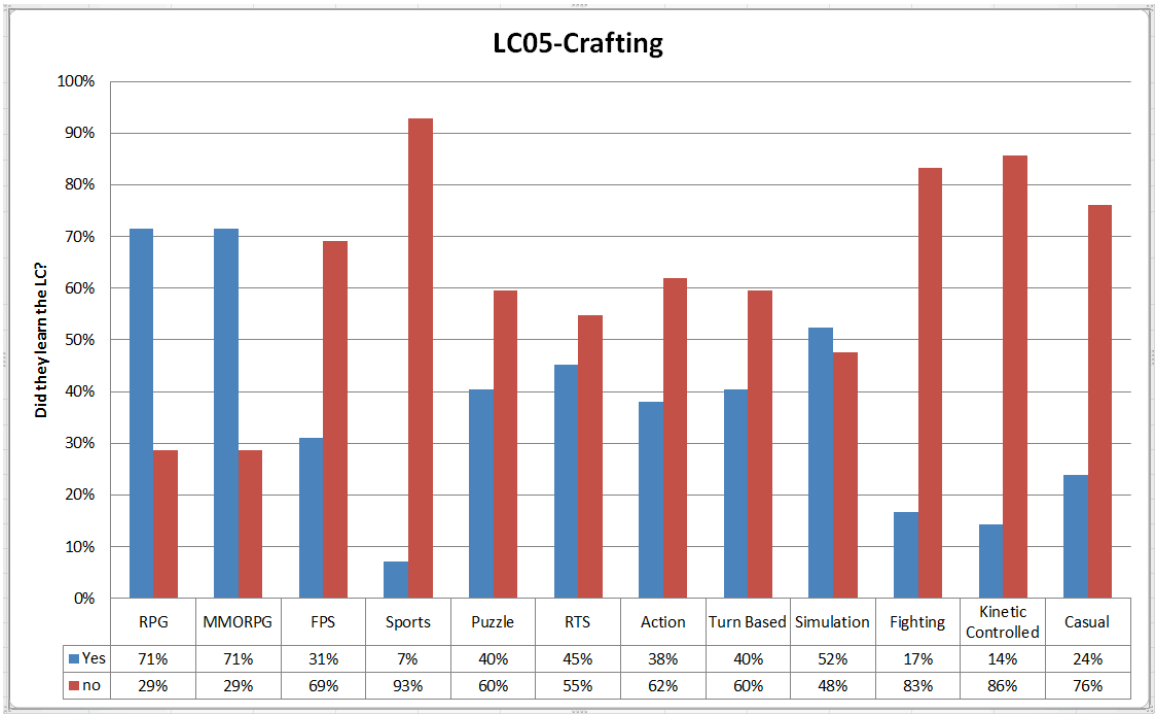
***Figure 7*. Bar graph results for creating a community learning construct compared to each video game genre.**

Crafting

Crafting was the fifth subtheme identified in the qualitative part of the study. The participants defined crafting as "the method to which a video game player learns to produce items (blocks, tools, materials, armor, etc.) for game use or trade." An example may include a player needing to craft their own medallions in an MMORPG to sell within the game or to simply upgrade their in-game character. Once the crafting subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Figure 8 shows the results for the learning construct of crafting. The participants felt that they learned to craft from playing three of the different video game genres. Those genres were MMORPG, RPG, and simulation. The MMORPG and RPG were both rated

high in the agree category at 71%. Simulation rated it at 52% agreement to learning the construct of crafting.



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	71%	71%	31%	7%	40%	45%	38%	40%	52%	17%	14%	24%
no	29%	29%	69%	93%	60%	55%	62%	60%	48%	83%	86%	76%

***Figure 8*. Bar graph results for crafting learning construct compared to each video game genre.**

Critical thinking

Critical thinking was the sixth subtheme identified in the qualitative part of the study. The participants defined critical thinking as "the method to which a video game player learns to reason at a high level of thought." An example would be a player in an action game like *Rachet and Clank*, where a player needs to critically think about completing a complex challenge in order to move on. Complex challenges requiring critical thinking in *Rachet and Clank* would include carefully selecting the most appropriate weapons, collecting lose bolts and other resources, keeping track of ammunition, finding and figuring out if you have the right key for a certain area, all while dodging and destroying countless in-game opponents. Once the critical thinking

subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

The learning construct of critical thinking was highly rated as being learned by two-thirds of the video game genres. Figure 9 shows the results for the learning construct of critical thinking. The participants felt that they learned critical thinking from playing eight of the video game genres which included RPG, MMORPG, FPS, sports, puzzle, RTS, turn-based, and simulation. Three of the agreement totals were above 90%. These totals were for RTS (95%), RPG (93%), and puzzle (93%). Turn-based and simulation rated high in agreement with values respectively reported at 83% and 81%. Both MMORPG and FPS shared the same agree rating at 74%. Finally, the last agree rating at 62% was reported by action.

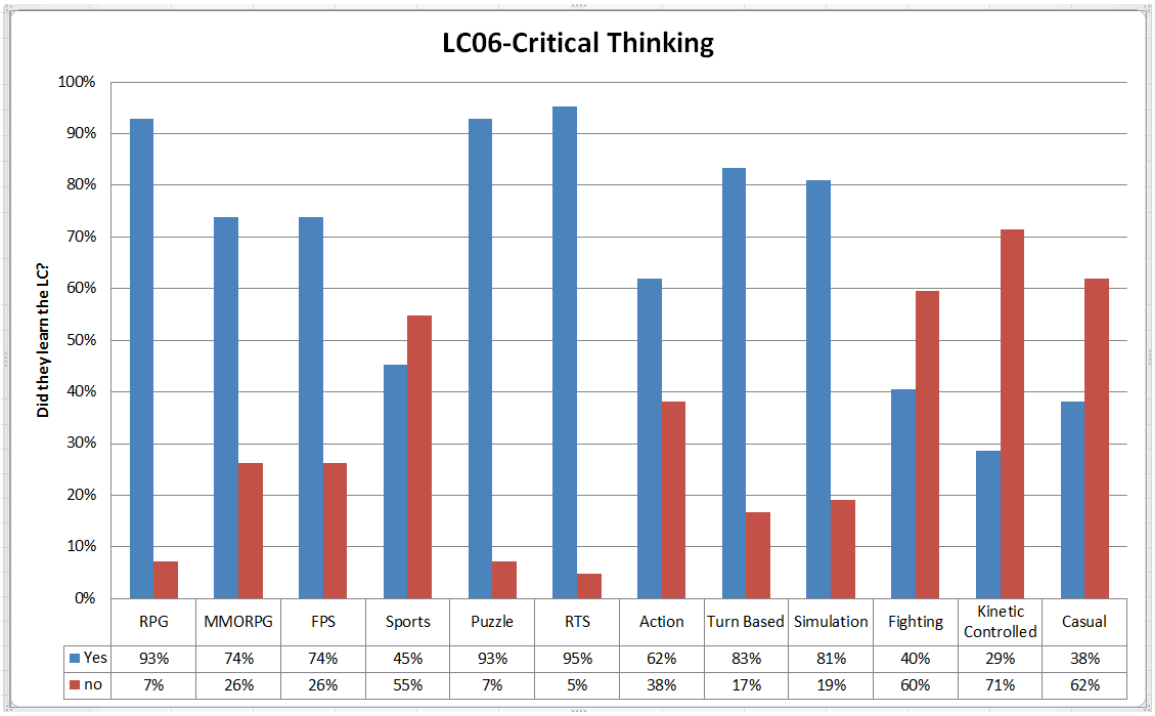


Figure 9. Bar graph results for critical thinking construct compared to each video game genre.

Attention to detail

Attention to detail was the seventh subtheme identified in the qualitative part of the study. The participants defined attention to detail as "the method to which a video game player learns to concentrate on the important details necessary to completing or accomplishing different tasks." An example of attention to detail would be a player paying attention to their guard when an opponent starts a super combo in a fighting game. Once the attention to detail subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

There were nine video game genres that participants agreed to have learned from attention to detail. Figure 10 shows the results for the learning construct of attention to

detail. The participants felt that they learned to pay attention to detail from playing RPG, MMORPG, FPS, Sports, Puzzle, RTS, action, turn-based, and simulation. There were three agreement totals that were 90% and above: RTS (93%), RPG (90%), and Puzzle (90%). FPS was rated at 86%, while MMORPG, turn-based, and simulation all scored a 79%. The action genre was rated at 69% and sports was rated at 50%. Thus, three video game genres did not teach the learning construct: fighting, kinetic-controlled, and casual.

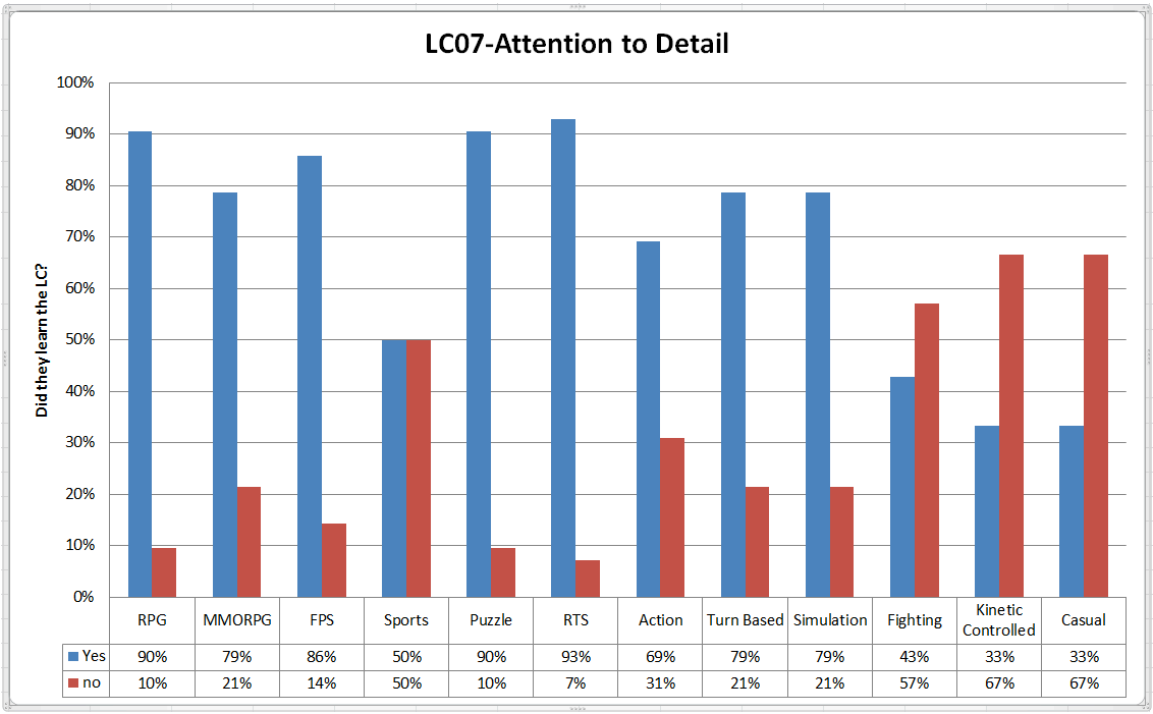


***Figure 10*. Bar graph results for attention to detail construct compared to each video game genre.**

Building management

Building management was the eighth subtheme identified in the qualitative part of the study. The participants defined building management as "the method to which a video game player learns to develop certain structures in order to create products necessary for economical success or growth." An example of building management would be a player building and preparing for an offensive air assault attack in an RTS game by focusing on

structures and technology upgrades necessary for air combat. Once the building management subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

There were five video game genres that agreed or somewhat agreed to the learning construct of building management. Figure 11 shows the results for the learning construct of building management with the video game genres. There were five genres that reported agreement which were RTS (83%), turn-based (67%), simulation (64%), RPG (57%), and MMORPG (55%).

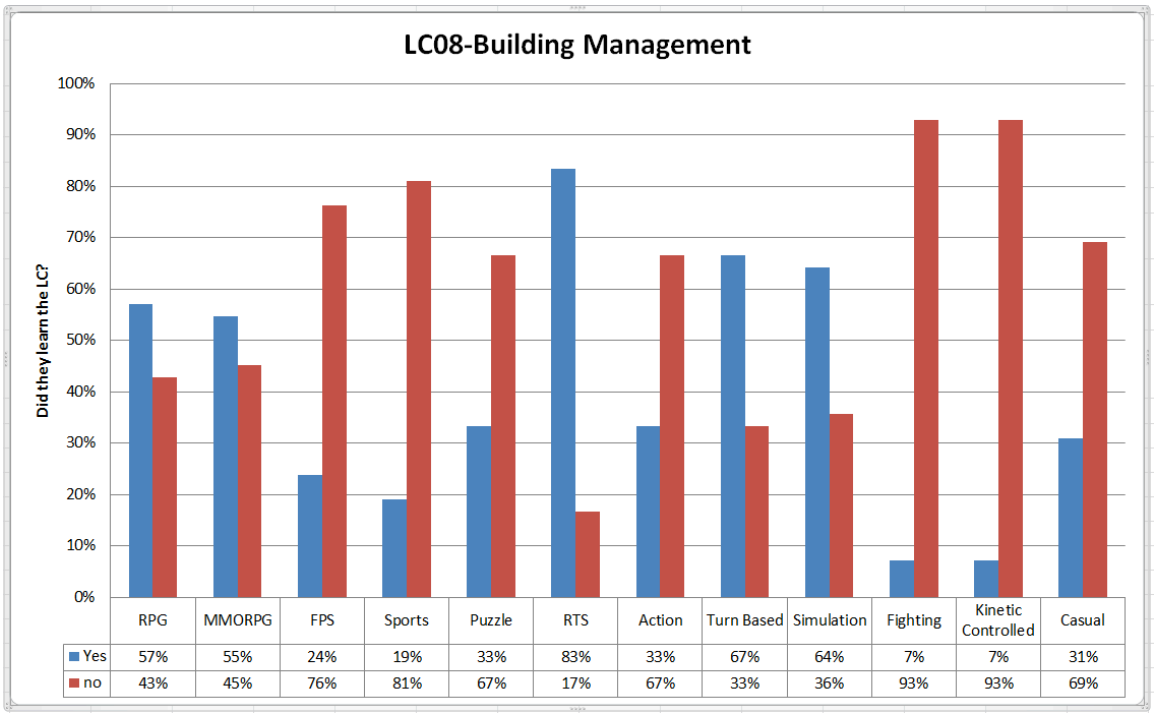


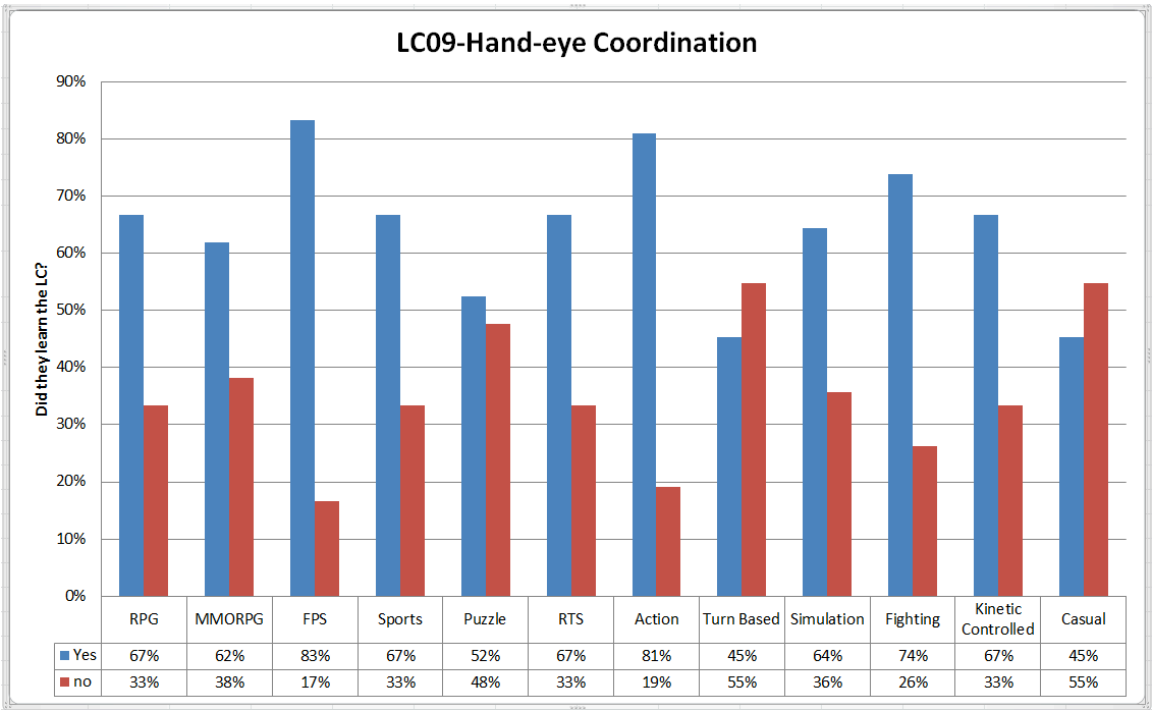
Figure 11. Bar graph results for building management construct compared to each video game genre.

Hand-eye coordination

Hand-eye coordination was the ninth subtheme identified in the qualitative part of the study. The participants defined hand-eye coordination as "the coordinated control of eye movement with hand movement as part of completing everyday tasks." An example might include following an on-screen ball with your eyes and acting upon its movement in various sports games. Once the hand-eye coordination subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Ten of the twelve genres reported agreement to learning hand-eye coordination. The average total of the agree and somewhat agree values for each genre was 68%. The two highest rated video game genres were FPS (83%) and action (81%). The two lowest

agreement scores reported were puzzle (52%) and MMORPG (62%). The two games that were close, but not in agreement, were turn-based (45%) and casual (45%). The results for the hand-eye coordination learning construct are seen Figure 12 below.



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	67%	62%	83%	67%	52%	67%	81%	45%	64%	74%	67%	45%
no	33%	38%	17%	33%	48%	33%	19%	55%	36%	26%	33%	55%

***Figure 12*. Bar graph results for hand-eye coordination construct compared to each video game genre.**

How to be competitive

How to be competitive was the tenth subtheme identified in the qualitative part of the study. The participants defined how to be competitive as "the practice and use of learned strategies that a video game player utilizes to achieve success against others." An example might include a player-versus-player scenario in a turn-based game in which the participants use different strategies to try and beat the other player. Once the how to be competitive subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

In ten of the twelve video game genres, participants believed that they learned how to be competitive while playing them. The two highest rated video game genres were FPS (93%) and RTS (90%). The next set of agreement ratings were found to be around the mid-seventy percentiles. These genres were MMORPG (74%), turn-based (76%), and fighting (76%). The rest of the remaining genres reported agreement in the fiftieth to sixtieth percentiles. The remaining agreement rated genres were action (69%), RPG (64%), sports (62%), puzzle (60%), and simulation (52%). There were two video game genres that did not teach this learning construct. They were the kinetic-controlled and casual genres. Figure 13 shows the results for the how to be competitive learning construct.

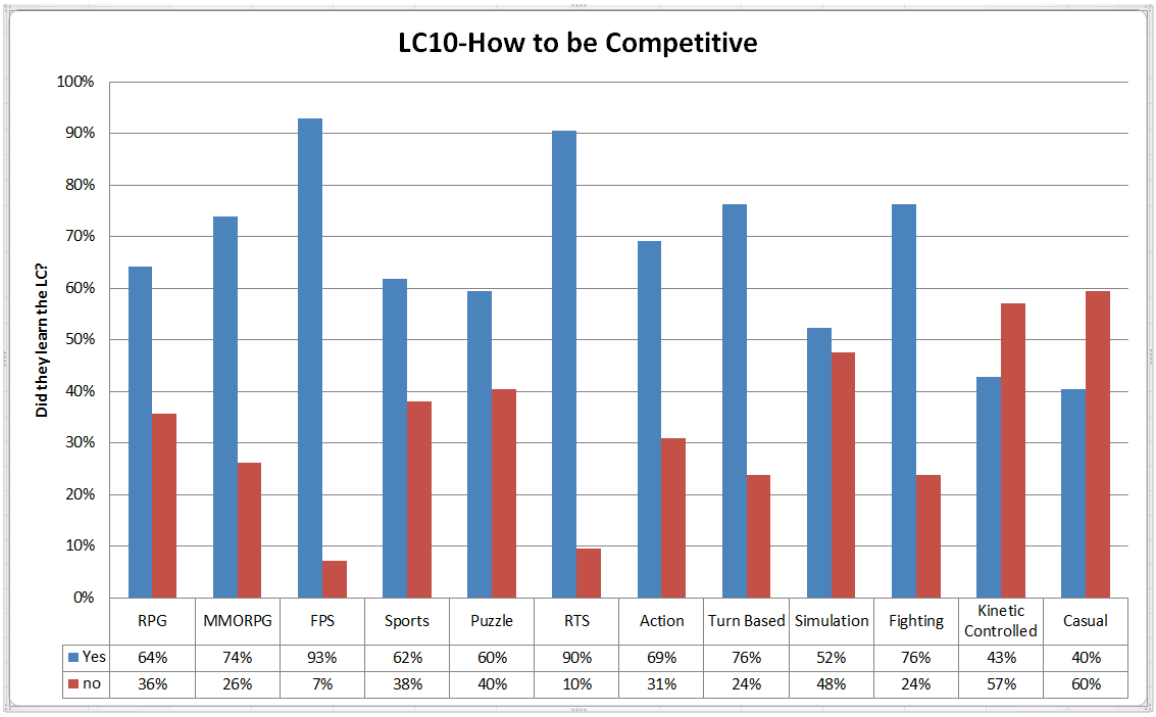


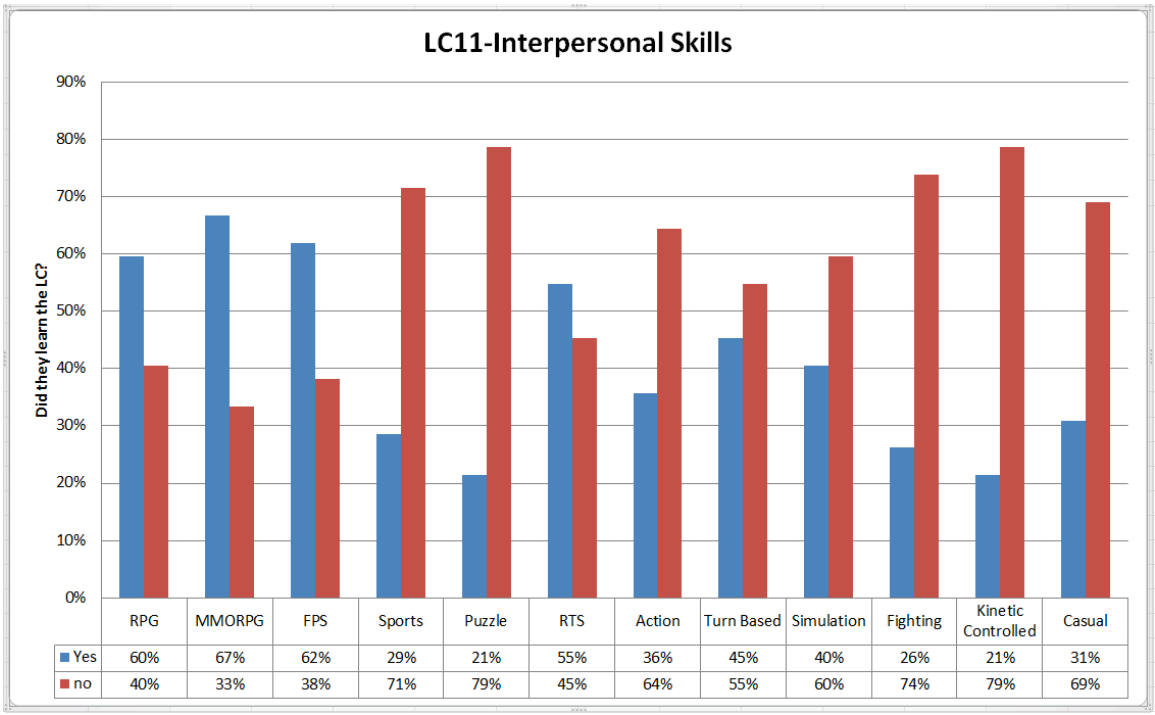
***Figure 13*. Bar graph results for how to be competitive construct compared to each video game genre.**

Interpersonal skills

Interpersonal skills was the eleventh subtheme identified in the qualitative part of the study. The participants defined interpersonal skills as "life and social skills used daily to effectively communicate and interact with others." An example would include a player being able to start a dialogue with other players to be cordial, supportive, interactive, or combative. Once the interpersonal skills subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Figure 14 shows the results for the learning construct of interpersonal skills. The participants felt that they learned interpersonal skills from playing RPG, MMORPG, FPS, and RTS genres. The agreement totals were in the sixtieth percentiles for MMORPG

(67%), RPG (60%), and FPS (62%). The last genre, RTS, was rated at 55% in agreement to learning interpersonal skills.



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	60%	67%	62%	29%	21%	55%	36%	45%	40%	26%	21%	31%
no	40%	33%	38%	71%	79%	45%	64%	55%	60%	74%	79%	69%

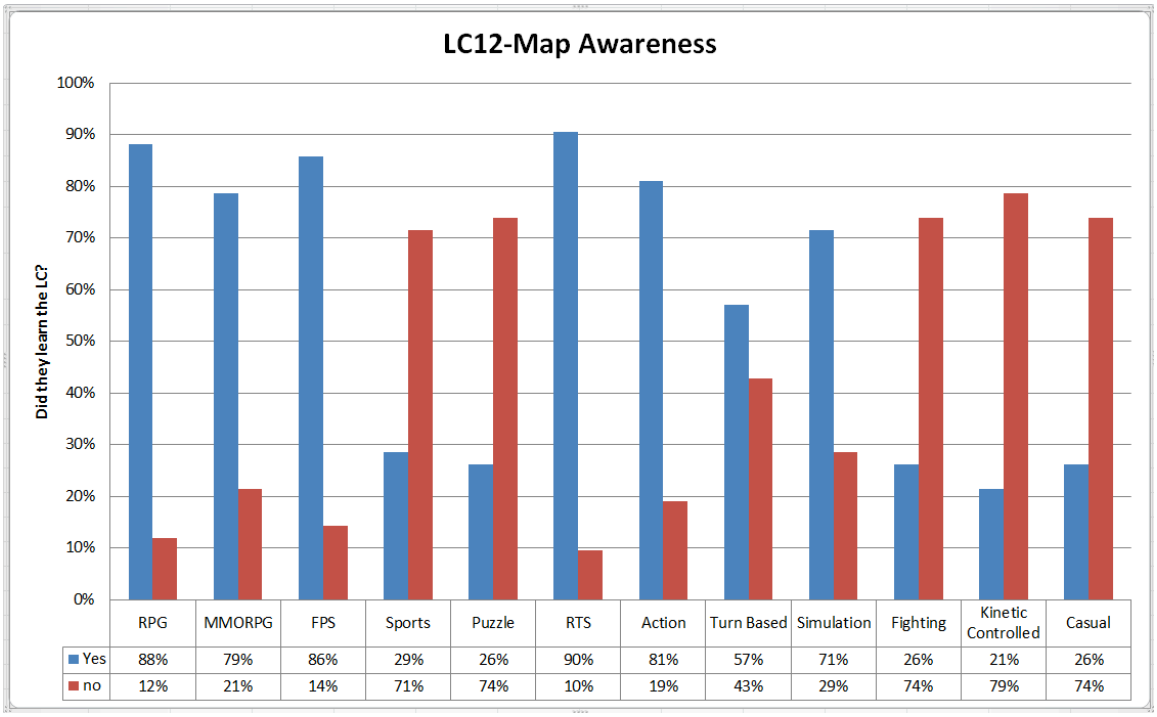
***Figure 14*. Bar graph results for interpersonal skills learning construct compared to each video game genre.**

Map awareness

Map awareness was the twelfth subtheme identified in the qualitative part of the study. The participants defined map awareness as "the ability to learn and decipher a map's terrain or environment while always knowing your own position. Map awareness also allows you to take advantage of certain positions on a map to maximize task success." An example would include deciphering a map to know where a "save point" is in an action game or RPG. Save points are important markers found only in specific areas that allow a player to save their in-game data to that current point in case their character dies or if the player decides to temporarily leave the game. Once the map awareness subtheme was entered into the survey tool and then administered, the sample population

of video game players was asked to rate the learning construct according to each video game genre.

Figure 15 shows the results for the learning construct of map awareness. Participants indicated seven genres that taught them the map awareness learning construct. The seven genres and their agreement percent totals were RTS (90%), RPG (88%), FPS (86%), action (81%), MMORPG (79%), simulation (71%), and turn-based (57%).



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	88%	79%	86%	29%	26%	90%	81%	57%	71%	26%	21%	26%
no	12%	21%	14%	71%	74%	10%	19%	43%	29%	74%	79%	74%

***Figure 15*. Bar graph results for map awareness learning construct compared to each video game genre.**

Conduct research

Conduct research was the thirteenth subtheme identified in the qualitative part of the study. The participants defined conduct research as "the ability to search for different resources to learn more about a certain topic to achieve success." Conduct research is

exemplified when a player cannot beat a particular boss in a game, so they then look up and research information or tactics on how to beat it. Once the conduct research subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Figure 16 shows the results for the learning construct of conduct research. There were seven genres that the participants felt they learned conduct research construct. The eight genres and their total percent on agreement were as follows: RPG (74%), RTS (71%), MMORPG (67%), turn-based (57%), simulation (57%), FPS (52%), action (52%), and puzzle (52%).

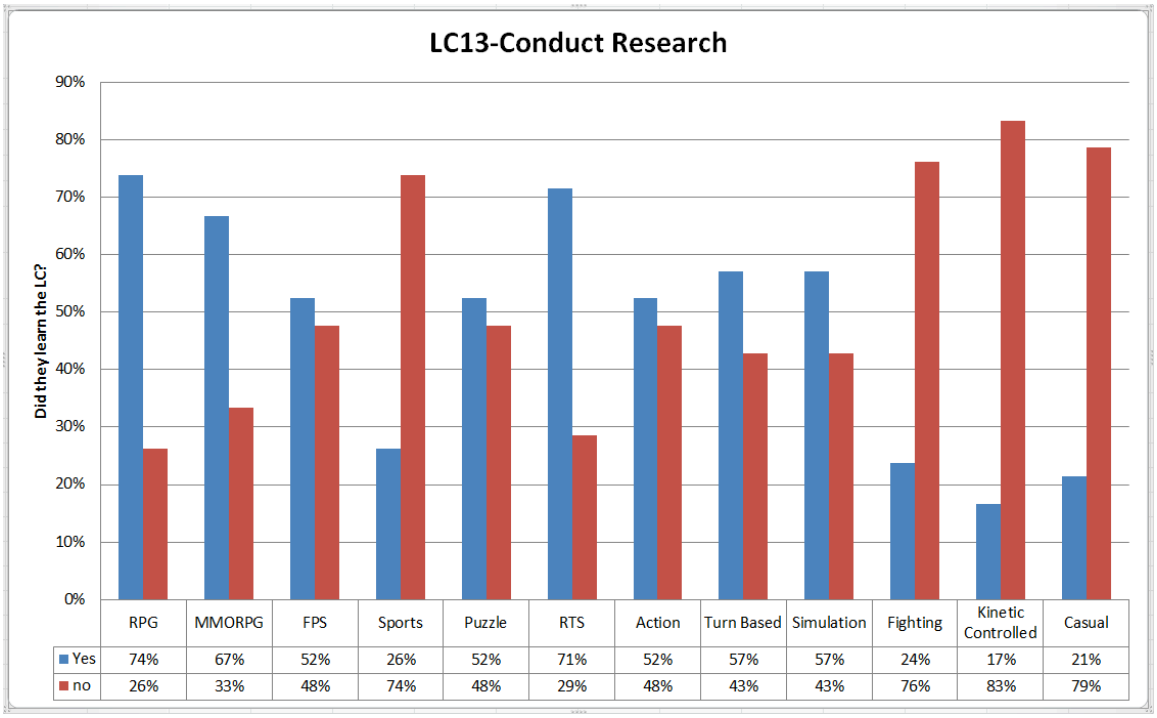
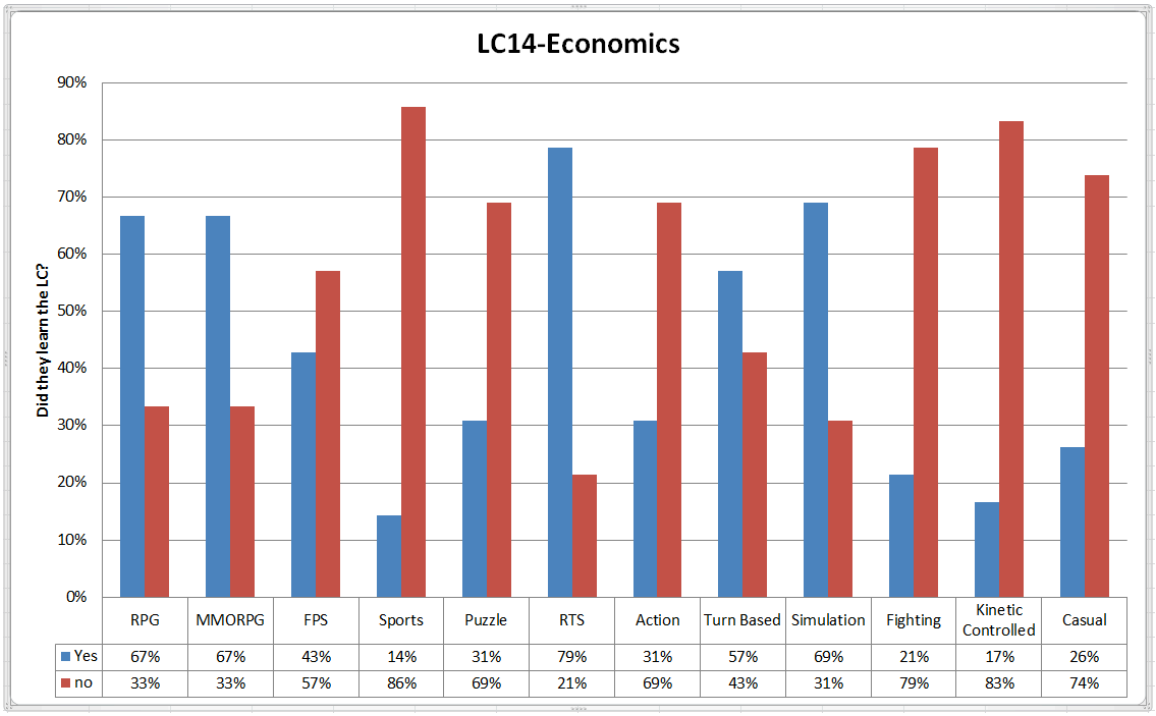


Figure 16. Bar graph results for conduct research learning construct compared to each video game genre.

Economics

Economics was the fourteenth subtheme identified in the qualitative part of the study. The participants defined economics as "the social science that studies the behavior of individuals, groups, and organizations in relation to how they manage, use, and understand scarce resources to achieve desired ends." An example of economics is a player knowing the amount of gold they have and need to collect in order to purchase and distribute amongst specific upgrades for their character. Once the economics subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

There were five video game genres that participants agreed to have learned the economics learning construct. Figure 17 shows the results for the learning construct of economics. The five genres with the agreement ratings were RTS (79%), simulation (69%), RPG (67%), MMORPG (67%), and turn-based (57%).



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	67%	67%	43%	14%	31%	79%	31%	57%	69%	21%	17%	26%
no	33%	33%	57%	86%	69%	21%	69%	43%	31%	79%	83%	74%

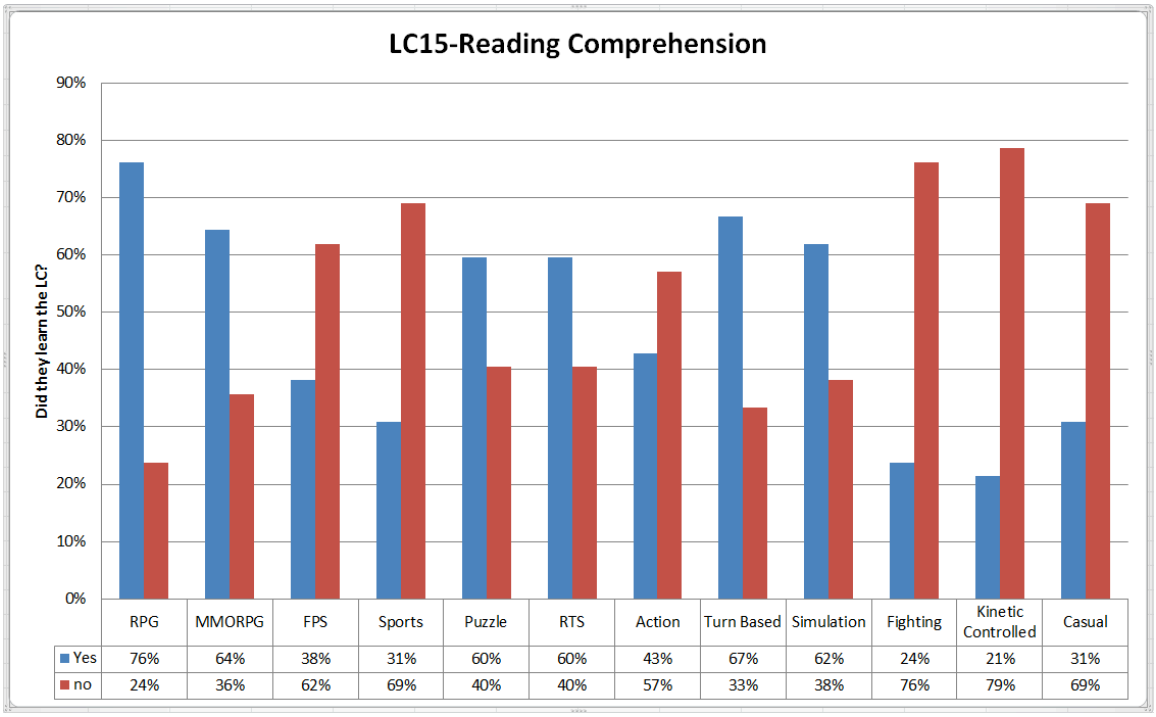
***Figure 17*. Bar graph results for economics learning construct compared to each video game genre.**

Reading comprehension

Reading comprehension was the fifteenth subtheme identified in the qualitative part of the study. The participants defined reading comprehension as "the act of understanding what you are reading. It is an active and intentional process that occurs during and after reading a particular piece of writing or text." An example of reading comprehension is when a player is given written dialogue and they must comprehend and analyze what is being said or they will fail their next task. Once the reading comprehension subtheme was entered into the survey tool and then administered, the

sample population of video game players was asked to rate the learning construct according to each video game genre.

There were six video game genres that participants agreed to have learned the reading comprehension learning construct. Figure 18 shows the results for the learning construct of reading comprehension. The six genres with the agreement ratings were RPG (76%), turn-based (67%), MMORPG (64%), simulation (62%), RTS (60%), and puzzle (60%).



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	76%	64%	38%	31%	60%	60%	43%	67%	62%	24%	21%	31%
no	24%	36%	62%	69%	40%	40%	57%	33%	38%	76%	79%	69%

***Figure 18*. Bar graph results for reading comprehension learning construct compared to each video game genre.**

Resource management

Resource management was the sixteenth subtheme identified in the qualitative part of the study. The participants defined resource management as "the ability to efficiently and effectively deploy resources to maximize success." An example of resource management would be when playing a MMORPG set in space a player needs to

effectively manage their fuel supply in order to travel immense distances while carrying all their necessary cargo. Once the resource management subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

There were eight video game genres that participants agreed to have learned the resource management learning construct. Figure 19 shows the results for the learning construct of resource management. The eight genres with their agreement ratings were RTS (88%), turn-based (74%), simulation (69%), RPG (69%), MMORPG (67%), FPS (62%), action (52%), and puzzle (50%).

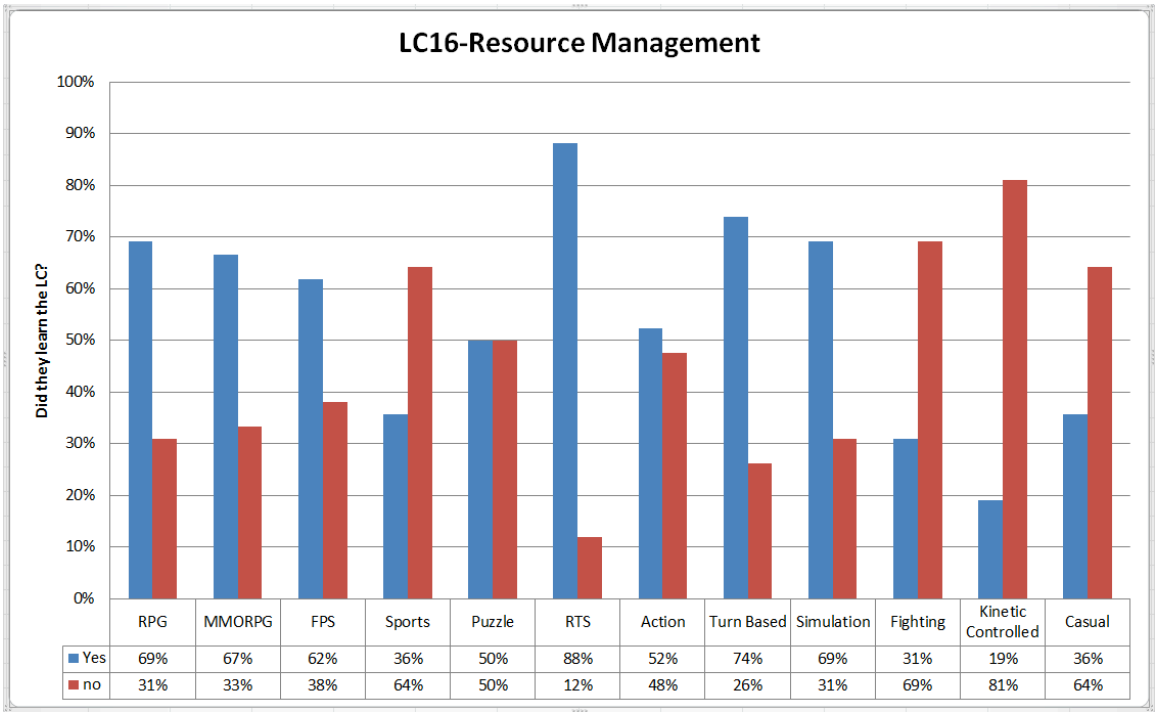


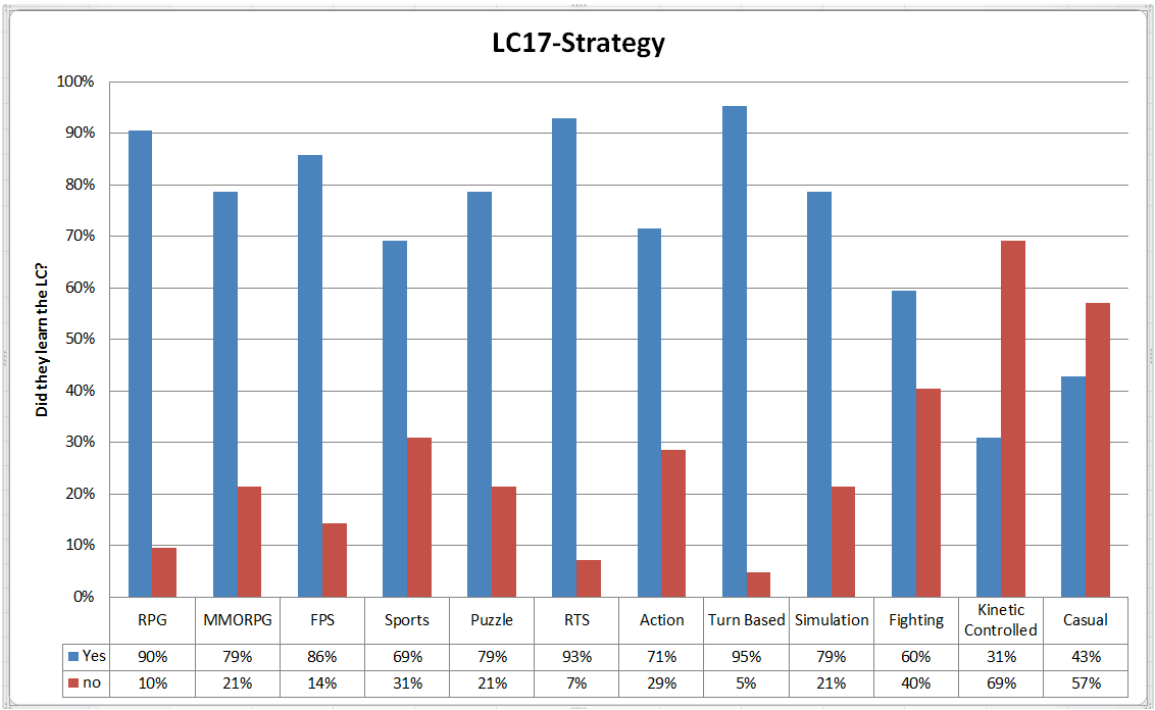
***Figure 19*. Bar graph results for resource management learning construct compared to each video game genre.**

Strategy

Strategy was the seventeenth subtheme identified in the qualitative part of the study. The participants defined strategy as "the ability to create a plan designed to

achieve a goal." Strategy is usually required to pass a level, beat a boss, or defeat an opponent and often involves identifying a particular weakness or pattern and devising a method to achieve success. Once the resource management subtheme was entered into the survey tool and then administered, the sample population of video game players were asked to rate the learning construct according to each video game genre.

For the strategy learning construct, 10 of the 12 genres agreed to have learned strategy. The two genres that did not teach strategy were kinetic-controlled games and casual game genres. The average percent for agreeing to learn the strategy learning construct was 80%. There were three video game genres that scored very high in the agreement category. These genres were turn-based (95%), RTS (93%), and RPG (90%). Figure 20 shows all results related to the strategy learning construct.



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	90%	79%	86%	69%	79%	93%	71%	95%	79%	60%	31%	43%
no	10%	21%	14%	31%	21%	7%	29%	5%	21%	40%	69%	57%

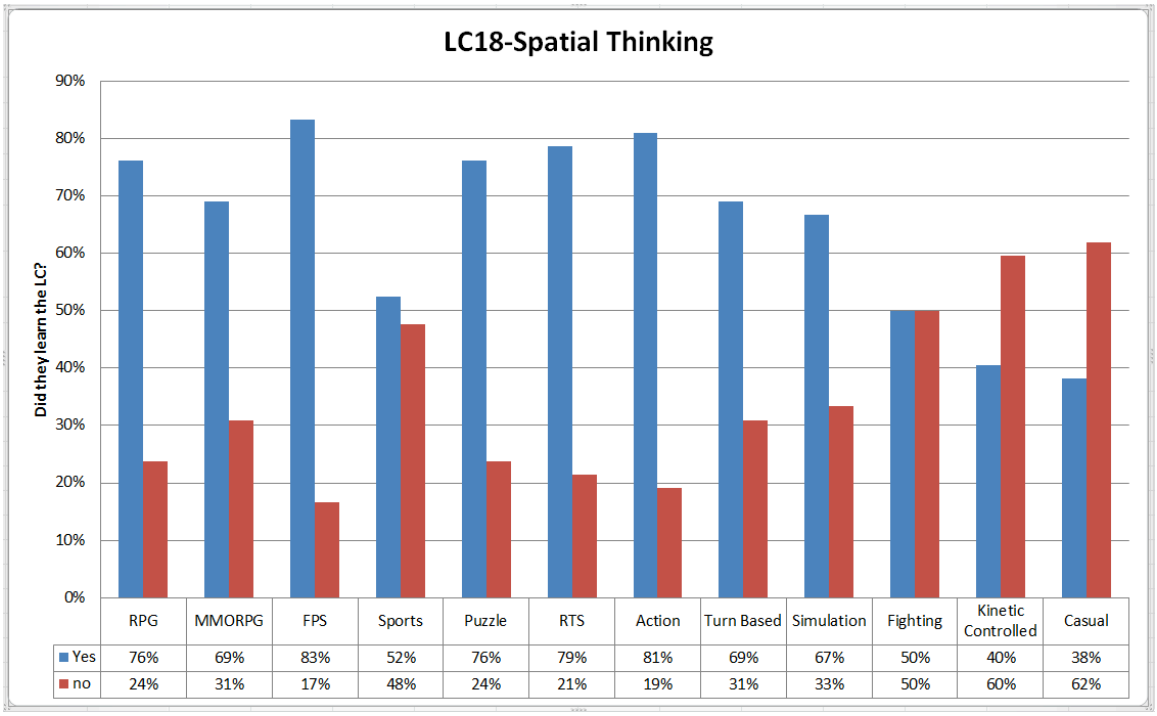
Figure 20. Bar graph results for strategy learning construct compared to each video game genre.

Spatial thinking

Spatial thinking was the eighteenth subtheme identified in the qualitative part of the study. The participants defined spatial thinking as "the ability to record information about one's environment and its spatial orientation." An example of spatial thinking is a player understanding the geometry of objects within a corridor and guiding their character safely through it without being attacked, falling into a pit, or hit by an obstacle. Once the spatial thinking subtheme was entered into the survey tool and then administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

Figure 21 shows all results related to the spatial thinking learning construct. The participants reported that 10 of the 12 video game genres taught the learning construct.

The average percent of learning the spatial thinking construct was 68%. For the ten genres, their agreement ratings were FPS (83%), action (81%), RTS (79%), RPG (76%), puzzle (76%), MMORPG (69%), turn-based (69%), simulation (67%), sports (52%), and fighting (50%).



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	76%	69%	83%	52%	76%	79%	81%	69%	67%	50%	40%	38%
no	24%	31%	17%	48%	24%	21%	19%	31%	33%	50%	60%	62%

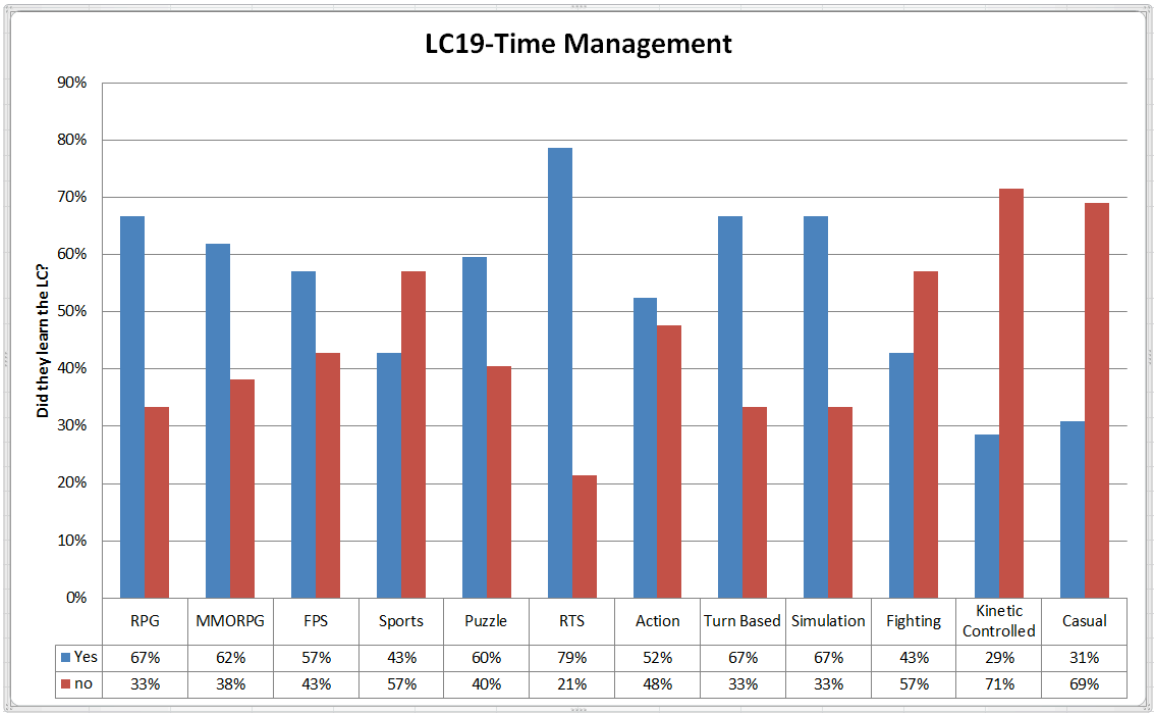
***Figure 21*. Bar graph results for spatial thinking construct compared to each video game genre.**

Time management

Time management was the last subtheme identified in the qualitative part of the study. The participants defined time management as "the act or process of planning and exercising conscious control over the amount of time spent on specific activities to effectively and efficiently complete tasks." An example of time management is when a player is playing a timed puzzle game they must make sure that they are effectively allotting an appropriate amount of time to each necessary objective without running out of time. Once the time management subtheme was entered into the survey tool and then

administered, the sample population of video game players was asked to rate the learning construct according to each video game genre.

There were eight video game genres that participants agreed to have learned the time management learning construct. Figure 22 shows the results for the learning construct of time management. For the eight genres, their agreement ratings were RTS (79%), turn-based (67%), simulation (67%), RPG (67%), MMORPG (62%), puzzle (60%), FPS (57%), and action (52%).



	RPG	MMORPG	FPS	Sports	Puzzle	RTS	Action	Turn Based	Simulation	Fighting	Kinetic Controlled	Casual
Yes	67%	62%	57%	43%	60%	79%	52%	67%	67%	43%	29%	31%
no	33%	38%	43%	57%	40%	21%	48%	33%	33%	57%	71%	69%

***Figure 22*. Bar graph results for spatial thinking construct compared to each video game genre.**

Summary of RepGrid Findings

The RepGrid technique was used to analyze the data in this exploratory study. Furthermore, the Personal Construct Theory was used in a mixed methods approach to address some of the gaps identified in the literature. Overall, video game genre studies are practically non-existent, so the researcher explored the new topic of video game

genres and learning. The themes that were developed from the data were genres, learning constructs, and the mapping of each learning construct to all video game genres.

In regards to the first theme of video game genres, the focus groups and interviews reported twelve subthemes. Those subthemes were the different video game genres identified as RPG, MMORPG, FPS, sports, puzzle, RTS, action, turn-based, simulation, fighting, kinetic-controlled, and casual. The participants also provided the definitions for each video game genre. Video game title examples were also provided to help clearly exemplify which specific video games belong to each particular genre. Evaluating different video game genres is an important first step in gaining a better understanding of how these genres relate to different types of learning through playing video games.

In regards to the second theme of learning constructs, the focus groups and interviews reported nineteen subthemes, which were the learning constructs that were established from playing the 12 different video game genres. The participants identified nineteen learning constructs that resulted from the combination of the focus group responses and follow up interviews used to improve accuracy and reliability of the results. Table 10 shows the comprehensive list of learning constructs and their definitions. The importance of establishing the learning constructs were that educated video game players with a more experienced and "expert" point of view were the ones developing the learning constructs. The idea behind creating a comprehensive list was that the general subthemes would be tested with each video game genre.

The survey results were collected to determine if the genre taught all, some, or none of the learning constructs. Thus, the last set of data points collected came from the survey tool. The survey tool acknowledged and identified which video game genres

taught each of the learning constructs. In the survey tool, each participant rated whether they agreed or disagreed with learning each of the learning constructs from the different video game genre. A video game genre was identified as being able to teach a learning construct when 50% or more of the participants selected agreed to learning the concept while playing a particular video game genre. Overall, 11 of the 12 video game genres taught at least one of the learning constructs. The average number of learning constructs each video game genre taught was 10.5. Of the nineteen learning constructs, eighteen of them were taught by at least three of the genres.

Figure 23 is the quick reference tool that was developed to show which video game genres taught a learning concept and at what percentage it was agreed upon. The green highlighted cells indicate which video game genres were able to teach a particular learning construct while the blank cells show that the genre did not teach the learning construct.

		Coding/computer programming	Conflict Mngt.	Comm. Skills	Creating a community	Crafting	Critical thinking	Attention to detail	Building Mngt.	Hand-eye coordination	How to be competitive	Interpersonal skills	Map awareness	Conduct research	Economics	Reading comprehension	Resource Mngt.	Strategy	Spatial thinking	Time Mngt.
		LC01	LC02	LC03	LC04	LC05	LC06	LC07	LC08	LC09	LC10	LC11	LC12	LC13	LC14	LC15	LC16	LC17	LC18	LC19
1	RPG	21%	69%	64%	52%	71%	93%	90%	57%	67%	64%	60%	88%	74%	67%	76%	69%	90%	76%	67%
2	MMORPG	19%	62%	79%	79%	71%	74%	79%	55%	62%	74%	67%	79%	67%	67%	64%	67%	79%	69%	62%
3	FPS	17%	57%	71%	79%	31%	74%	86%	24%	83%	93%	62%	86%	52%	43%	38%	62%	86%	83%	57%
4	Sports	10%	29%	24%	29%	7%	45%	50%	19%	67%	62%	29%	29%	26%	14%	31%	36%	69%	52%	43%
5	Puzzle	14%	36%	24%	14%	40%	93%	90%	33%	52%	60%	21%	26%	52%	31%	60%	50%	79%	76%	60%
6	RTS	12%	55%	62%	50%	45%	95%	93%	83%	67%	90%	55%	90%	71%	79%	60%	88%	93%	79%	79%
7	Action	17%	43%	50%	38%	38%	62%	69%	33%	81%	69%	36%	81%	52%	31%	43%	52%	71%	81%	52%
8	Turn Based	17%	57%	43%	40%	40%	83%	79%	67%	45%	76%	45%	57%	57%	57%	67%	74%	95%	69%	67%
9	Simulation	14%	60%	43%	40%	52%	81%	79%	64%	64%	52%	40%	71%	57%	69%	62%	69%	79%	67%	67%
10	Fighting	12%	19%	21%	24%	17%	40%	43%	7%	74%	76%	26%	26%	24%	21%	24%	31%	60%	50%	43%
11	Kinetic Controlled	7%	17%	19%	17%	14%	29%	33%	7%	67%	43%	21%	21%	17%	17%	21%	19%	31%	40%	29%
12	Casual	14%	21%	26%	33%	24%	38%	33%	31%	45%	40%	31%	26%	21%	26%	31%	36%	43%	38%	31%

Figure 23. Quick reference tool of video game genres and the percentages that the participants agreed to have learned the learning concept. Values in green are recognized as teaching it with a value of 50% or more.

Overall reports of the data collected were reported in this chapter. The three themes that emerged in relation to the research questions are discussed in the next chapter. In addition, the next chapter presents the major themes and provides a deduction on them. The researcher comments on future implications based on what has been discussed. Limitations of this study are included in the next chapter. With the facts and figures of the results, a visual grid of the learning constructs and which video game genres taught is

presented. The researcher concludes with a summary of the study and its application to the real world.

CHAPTER 5. CONCLUSIONS

Overview

The purpose of this exploratory study was to examine what video game players were learning from playing video games that were defined by different genres. The major themes resulting from data collection in this study included:

- Identifying what video game genres were identified by video game players.
- Identifying what was being learned from playing different video game genres.
- Discovering if there were similarities in learning between different video game genres.

This study established a list of video game genres, a list of learning constructs, and developed and tested a tool that explored the relationships between video game genres and learning.

Discussion of Findings

The discussed literature found in Chapter 2 was reviewed and provided the background for the up-to-date research that has been done in the realm of video games and learning. While that research touched upon some topics, there was not an in-depth examination of video game genres as they related to learning. Specifically, three areas of research were overlooked. These included: (a) no real comprehensive list of defined video game genres, (b) no studies that recognized what was being learned from playing

video game genres, and (c) no relationships were identified between playing video game genres and their learning constructs.

This chapter addresses the research questions posed in this dissertation using the themes resulting from this study's data collection. Each theme proposes an answer to one or more of the research questions asked. Those answers are discussed along with explanations of their significance to this study's findings. With the analyses described in this chapter, suggestions are made for other researchers to examine or extend upon this study to further the body of knowledge in video game research. Overall, this study supports the assertion that video games can be an important tool for teaching and learning. This study begins to make the inferences that playing video game genres can be an important tool for teaching and learning. Prior research acknowledges that video games are an engaging way for students to learn, but this study indicates that video game genres may offer more to the field of research in learning.

This research indicates that with video game genres and learning, educators could address certain learning constructs by using particular genres. In other words, educators could use this study as a guide for what kinds of games to use for different kinds of learning. This research establishes an entry point in which educators could begin to start looking at specified video game genres as useful tools for learning.

To support this conclusion I will compare my findings to the literature reviewed, highlighting any similarities or differences found. This study has been strictly exploratory, and the research questions asked have been fundamental questions on video game genres, what has been learned from playing video game genres, and what video game genres are similar to each other when teaching learning constructs.

Overview of Major Themes

Theme: Video game genres

The first question asked was which video game genres would video game players identify. As previous research mentioned, reporting on video game genres or classifications was difficult because many video games fall under different categories (Gros, 2007). In the Gros study, seven genres were identified. These included action, adventure, fighting, RPG, simulation, sports, and strategy. All seven of the genres that were identified in the Gros study were identified in this study. This study identified five more video game genres which included MMORPG, puzzle, turn-based, kinetic, and casual. Gros (2007) included the genre adventure which was not identified by this study group.

Lenhart et al. (2008) identified fourteen video game genres, seven of which were similar to the findings of this study. RPG, MMO, FPS, sports, action, RTS/simulation, and fighter were the genres that were found in common between that study and this one, but Lenhart et al. also identified racing, adventure, rhythm, survival horror, and virtual game genres. Electronic Arts (2012) listed twelve video game genres, seven of which were common to the findings of this study, including RPG, FPS, sports, puzzle, RTS, action and simulation. EA also identified horror, racing, family, kids, and music. Table 11 shows the number of video game genres identified by other sources. The genres have been aligned to see which genres were similarly named, along with listing other genres not named by this study.

Table 11. Tabled results of video game genres compared to other reported video game genres.

Genres Identified in this Study	Genres Identified by Gros (Gros, 2007)	Lengart et al. (Lenhart, Amanda et al., 2008)	EA("All Games - Electronic Arts - EA," 2012)
RPG	RPG	RPG	RPG
MMORPG		MMOGs	
FPS		FPS	Shooters
Sports	Sports	Sports	Sports
Puzzle		Puzzle	Puzzle
RTS	Strategy	Strategy	Strategy
Action	Action	Action	Action
Turn-based			
Simulation	Simulation	Simulation	Simulation
Fighting	Fighting	Fighting	
Kinetic-controlled			
Casual			
	Adventure	Adventure	
		Racing	Racing
		Survival/Horror	Horror
		Rhythm	Music
		MMOGs	
		Virtual	
			Family
			Kids

By comparing the results of this study to previous literature, it was apparent that participants in this study did not identify some of the genres identified in other research. The Lenhart et al. study (2008) identified games according to teens. EA (2012) is a game manufacturer that categorizes its genres for the general public to purchase and consume. The Gros (2007) study used a combination of categories according to industry, developers, and academics. Overall, the taxonomy is not easy to classify because of the number of games that could be classified as different genres. For instance, racing was identified by Lenhart et al. (2008) and EA (2012), but not identified in this study. With further discussion during the qualitative phase of this study, participants felt that racing games could be classified into either the simulation or sports genre. Another example of this was that participants felt that racing games fit better under a simulation genre because of gameplay simulated racing. Lenhart et al. (2008) and EA (2012) both identified horror as a genre, but the participants in this study felt that horror games were classified as either action or FPS. Participants agreed that it really depended upon the gameplay of the horror title being examined. Lenhart et al. (2008) and EA (2012) also named rhythm and music as video game genres, but the participants in this study felt that those genres fit better under kinetic-controlled games. They felt that kinetic-controlled games covered more video game titles because the main input of playing these types of games depended on the actual physical movements of a person to control video game movements on-screen. It seemed logical that if a player controlled a game via movement of the body and not just the traditional hand controller then it would be classified in the kinetic-controlled video game genre.

The target population for this study was video game players set in an institution of higher education. Participants were expected to be affiliated with an extracurricular group of video game players for all extent and purposes; therefore, they were considered educated expert consumers of video games. The participants essentially were chosen because they were considered pseudo experts in the field of playing video games, even without any formal training or education on the development of video games. Although many of them were not involved in any form of video game creation, many of them were interested in doing so. This was confirmed with the demographic question on their interests in developing video games. When asked if they were interested in developing a video game, a third of the participants said they had tried to develop a video game on their own time in the past or were interested in doing so in the future. Thus, using these particular participants for this exploratory study was an appropriate place to start for identifying video game genres.

With the utilization of the RepGrid tool, the twelve video game genres identified were RPG, MMORPG, FPS, sports, puzzle, RTS, action, turn-based, simulation, fighting, kinetic-controlled, and casual video game. These are believed to be of expert opinion and a viable list of genres to be further explored and studied. One of the main reasons that makes classifications of genres difficult is that different groups classify genres and subgenres differently. An example would be the participants in this study felt that horror was a subgenre under adventure or FPS, while EA (2012) and Gros (2007) listed it as a main genre. However, as discussed, this list may not be exhaustive.

Theme: Learning constructs

Much of the research that has been conducted about video games has been about the violence or aggressive behavior associated with playing video games. The correlation that is expressed in large media outlets that all video games have negative effects on video game players is problematic. Popular media tends not to identify that there are different video game genres or recognize some of the positive effects of playing video games. The literature indicated that there were positive effects from playing video games that included learning, but the game research on video games and learning focused on single game titles versus entire video game genres. In a call for research to examine the theories of learning and how it needs to address the future of learning (Shaffer et al., 2004), many researchers looked at what students were learning from playing video games. But the current state of video game research seems to take the single game research approach, almost like a video game case study. Those studies yielded results that proved learning had occurred, but were not fully applicable as to whether inferences could be made towards other video game titles.

In this study, the researcher identified learning constructs in terms of looking at learning through the lenses of a genre. This method of discovery identified nineteen learning constructs by focus groups and during one-to-one interviews. The nineteen identified learning constructs were: coding/computer programming, conflict management, communication skills, creating a community, crafting, critical thinking, attention to detail, building management, hand-eye coordination, how to be competitive, interpersonal skills, map awareness, conduct research, economics, reading

comprehension, resource management, strategy, spatial thinking, and time management. All learning constructs are defined and displayed in Table 9.

In regards to learning from video games, previous researchers focused on how video games could be used as a teaching tool that could effectively engage and motivate learners (James Paul Gee, 2007b; Jenkins et al., 2003; Prensky, 2003). The results from the identification of learning constructs could add to the body of research that is seeking the types of learning that occurs from playing video games. An educator could possibly teach a particular learning construct by employing games of a certain identified game genre. However, video games should not necessarily be lumped into generalized statements regarding teaching. In fact, this study found that instructors should be aware that many different game genres could teach similar learning constructs. Moreover, many educators may not know or understand certain video game genres and therefore may be unable to relate their course content more broadly and instead focusing only on game titles with which they are already familiar. By defining genres and eventually categorizing games, educators will have more options to integrate gaming into their learning objectives.

This study identified learning constructs of video game genres as an initial step in better integrating games and instructional learning objectives. Video game genres can be one solution in the problem of engaging students who are unmotivated to learn via traditional practices. As conceptualized before, identifying learning via video game genres is a new direction in video game studies and learning. Along with the list of video game genres, this comprehensive list of learned constructs was used to develop the

survey tool for answering the research question on what are the relationships and similarities between video game genres and learning constructs.

Comparing Learning Constructs to Each Other

Most studies are finding that learning occurs during gameplay, but this study looked strictly at the video game genres and not just games specifically targeted for learning. Choosing to examine the video game genres selected in this study was important because that is what video game players are consuming. DFC Intelligence (n.d.) reports that the global market for video games in 2012 was $63 billion. This research examined the theme of game genres because it made sense to study the games that are currently being purchased by video game users and consumers. This exploratory study sought to discover not only the different video game genres and what has been learned from playing them, but also compare which video game genres could teach any of the identified learning constructs.

The last step in this study examined the relationships between the different video game genres and whether or not video game players were taught the learning constructs identified. This topic of identifying video game genres with learning constructs is a stepping stone in which other researchers could further elaborate. This study used the RepGrid technique to identify major learning constructs and how each genre was rated against each of them. With the results of this study, the researcher felt that future studies could explore a specific video game genre and seek to find genre specific learning constructs. This implies that there is possibly more to learn from individual game genres than the general nineteen learning constructs identified in this study.

For the last research question, this study compared some of the similarities found in video game genres and their learning constructs. When evaluating results, the researcher should reduce uncertainty by employing several data evaluating techniques (Patton, 2001). The researcher used a pair of methods in determining whether or not a genre taught a learning construct. The first method was to visually look at the mode or observe which 'agree' choice was selected the most in each genre. The second indicator used was adding the percentages of the 'agree' and 'somewhat agree' values and if the value was above 50% then it was determined that the participants agreed to have learned the learning construct. Figure 24 visually displays the order from most to least the number of learning constructs taught.

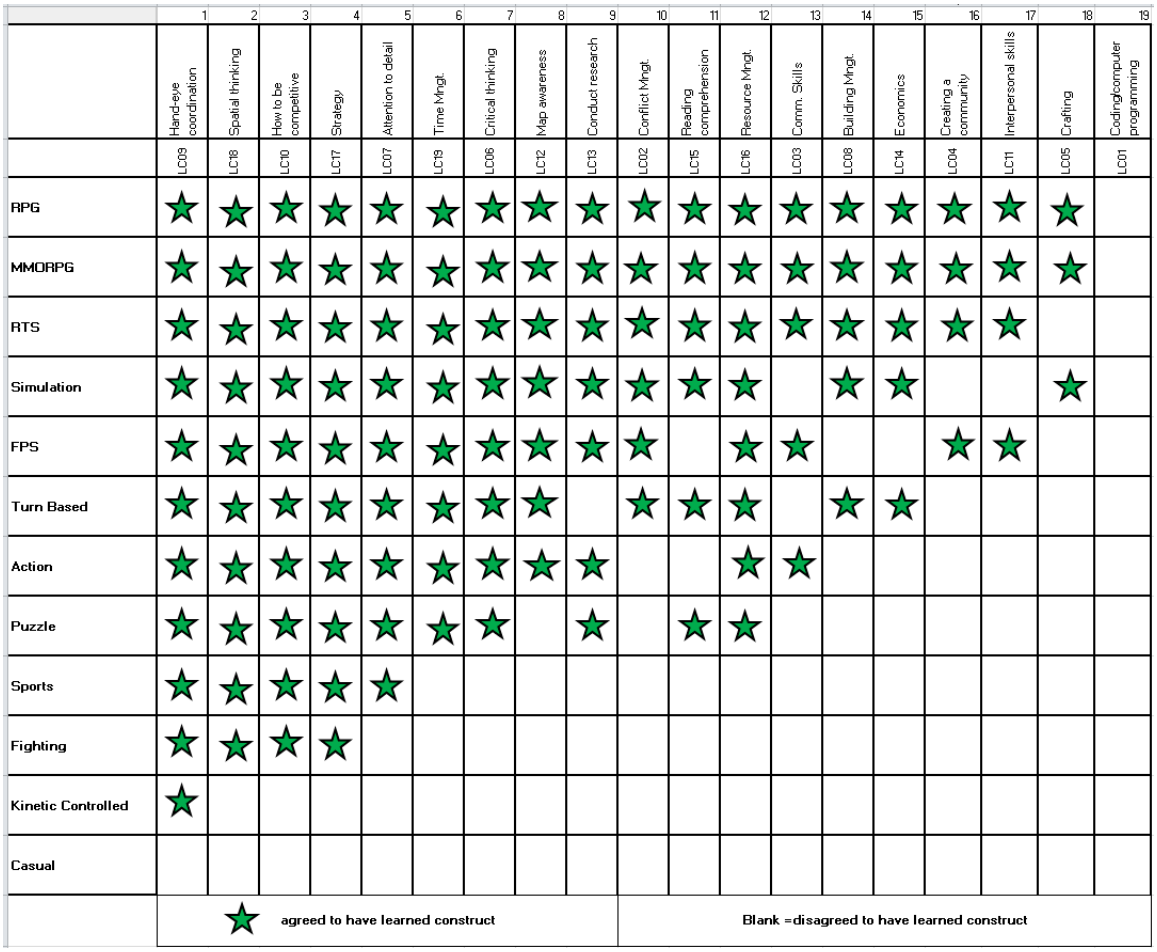


***Figure 24*. Ranked learning constructs according to how many genres taught it.**

Overall, results showed that all video games taught at least one learning concept except for coding/computer programming (see Figure 24). It was also interesting to find that each genre taught an average of 10.5 learning constructs each. By examining Figure 24 and the overall results, the RPG, MMORPG, simulation, and RTS genres taught most of the learning constructs. That may mean that generally speaking, one could use the core concepts of playing those video game genres to teach any number of learning constructs. From an educator's standpoint, Figure 24 could be used as a guide for finding out which video game genres could be used to teach any of the learning constructs. For example, if a teacher wanted to find out what video game genres they could use to teach

communication skills, they could look at the chart and see that there were five video game genres (RPG, MMORPG, FPS, RTS, and action) that could be used to teach that skill. Although the gameplay and strategies are very different between the genres, the results determined that those genres were able to teach that particular learning construct.

When examining the individual constructs, RPG and MMORPG genres lend to teaching 18 of the 19 learning constructs. This suggests that these genres are similar. RTS games followed closely behind with teaching 17 of the 19 learning constructs. The researcher also wanted to include RTS games into this group of similar genres, because they all have storylines that require character development. The investment needed to play these game genres require gamers to focus and multitask during gameplay in order to succeed. These types of genres also use larger maps. Another similarity found in these genres were the interactions that take place between the player, other players, and non-player characters. The basic gameplay also requires character investment to build, use resources, face challenges, increase skills, and ultimately become stronger to face and conquer new in-game challenges.

On the other hand, the learning construct that all three of the genres did not teach was coding/computer programming. It should be noted that coding/computer programming was not taught by any of the genres. Crafting was also not one of the learning concepts taught by RTS games. RTS did have an 'agree' rating of 45%, but according to the research parameters, 50% or more was what was needed to reach agreement.

Simulation games taught 15 of the 19 learning constructs. The researcher felt that simulation games mimic true to life game mechanics of something in the real world. It is

entirely possible to play a game that replicates the exact scenarios or environments that a video game player may face in real world situations. Hence, a video game player who is challenged with real world scenarios is required to use more learned skills to succeed in the game.

It was also noted that one video game genre did not teach any of the learning constructs. Casual games averaged a 31% 'agree' to all learning constructs. The researcher had inconclusive data to conclude why it did not teach any of the learning constructs. The researcher theorizes that casual games may be perceived as mindless gameplay with considerably less depth. As seen in the demographics of this study, many of the participants identified themselves as a gamer and may have felt that casual games were not a popular genre to play. Future studies on the casual game genre are needed to suggest why these learning ratings were so low.

Comparing Learning Constructs to Each Other

When examining the learning constructs, there were four learning constructs that were taught by at least 10 of the 12 video game genres. These four learning constructs were hand-eye coordination, how to be competitive, strategy, and spatial thinking. Attention to detail was taught in playing nine of the twelve video game genres. Finally, time management was taught by eight of the nine genres.

It was apparent that in order to play any of the video games, there needed to be some sort of hand-eye coordination necessary to control the character in the video game environment. The average agreed percentage for hand-eye coordination was 68%. Video games generally involve a great deal of competition, thus it made sense that how to be competitive would be taught by 83% of the genres. The average agreed percentage for

how to be competitive was 72%. From the demographic survey, 66% of the participants felt that they preferred playing games with others. Contrary to popular beliefs, the importance of the competition learning construct is that it implies social interaction fostered by the majority of the video game genres.

Spatial thinking was also taught by 10 video game genres, and this is believed to be because most games happen in some sort of unique environment or space. The average agreed percentage for spatial thinking was 70%. The average "agreed" percentage of strategy was 80%. The average agree percentage of strategy and its learning constructs was the highest agree average amongst the top four learned constructs. The researcher also stressed that spatial thinking is required for majority of the video games because most games happen in some sort of virtual space or environment. Of the learning constructs taught by 10 of the 12 video game genres, the spatial thinking construct averaged 70%.

The four learning constructs of hand-eye coordination, how to be competitive, strategy, and spatial thinking, each had two genres that did not teach them. The two video game genres that did not teach hand-eye coordination were turn-based and casual. How to be competitive, strategy, and spatial thinking were all not taught by casual games and kinetic-controlled games. As mentioned earlier, casual games had not taught any of the learning constructs. Similar to casual games, the researcher felt that kinetic-controlled games was a genre that did not require too much thought to play. Another discussion point was the fact that all participants in this study were adults and that there may be some fundamental learning differences between potential younger age groups and the

older participants in this study. Kinetic-controlled and casual games should be studied further to investigate why they had low ratings in most or all of the learning constructs.

Attention to detail was taught by many of the video game genres. This learning construct assumes that attention to detail is necessary to being successful in most genres. This is supported with an agree rating of 79%. The researcher noted games need to be challenging enough for the players or they will not be interested in playing them. Thus, successful games require players to take note in all facets of detail in order to unlock achievements, pass levels, beat others, or level up.

As mentioned earlier, coding/computer programming was not taught by any of the video game genres. With an "agree" average of 14%, the data stressed that it was not learned from playing any of the genres. The researcher theorized that coding/computer programming was such a specific task that the participants felt that they did not adequately learn it. To explore why it was rated very low, coding/computer programming should be reexamined as a learning construct in future studies.

Thus, there are a number of video game genres an educator or trainer could choose to use to teach a learning construct. They could essentially use a number of video game genres to exemplify or utilize teaching a specific learning construct. If video game genres are to become another instructional means of teaching, then the educator needs to become familiar with what each genre is and in what way it would be most efficient at teaching learning constructs. This study covers the breadth of using video game genres to teach different learning constructs but the next section sets out to make recommendations for further studies.

Future Research

With major findings of this research, the researcher suggests future research that may strengthen or expand on the topic of video game genres and learning. The survey research strategy chosen for this study was a mixed methods approach utilizing the RepGrid tool developed from the Personal Construct Theory. The researcher believes that there are other research tools and methods that could help support this research's findings.

The types of learning outcomes that have been achieved from playing serious video game genres in this study did not determine whether the participants learned the constructs formally or informally. The researcher hypothesizes that learning occurs on a tertiary level. This hypothesis assumes that video game players do not know that they have been learning a specific learning construct or concept from playing a certain video game genre. While on the topic of learning constructs, future studies could also test other video game subgenres or newly developed genres with the learning constructs discovered in this study. It is also hypothesized that the learning constructs discovered in this study could be applicable to testing individual video game titles in terms of teaching the nineteen learning constructs found here.

If research continues into video game genres as part of a curriculum, it is necessary for research to help develop a curriculum that exposes the instructor and the students to proper use of the new instructional tool. This calls for researchers to find the correlations between the different video game genres and learning constructs. Showing how strongly the variables are related can help determine how varied one learning construct is related to another learning construct according to video game genres. This could help determine

other factors not found in this study, such as the differences found in categorical data such as gender or job status.

This study identified a potential list of video game genres that could potentially be expanded on further with additional research. Another call for research would be to identify any sub video game genres and the learning concepts identified from playing them, or look at how there may be sub video game genres that fall under different major genres. It is important to recognize that different video games could technically be categorized under several genres. The idea here is to get away from general genres and into more complex and specifically identifiable ones. The researcher feels that there may be some genres that could prove to be important to teaching but are overlooked due to over the simplification of some genres. Video game genres in this study were difficult to identify and more studies are needed to verify and identify subgenres within a genre or several genres. Thus, another recommendation for future research would be to categorize games into genres. This approach will eventually help educators decide which video game examples they could use in video games and learning curriculum.

Limitations

While this study had a very good response rate, the study sample only covered video game players who were affiliated with a gaming club at a university. It is not possible to generalize these results to other video game players; however, this study aimed at using a purposeful homogeneous population as it is an exploratory study and the research in the topic was lacking. Using a purposefully sampled population of pseudo experts is an established way to build foundations for future studies (Creswell, Clark, Gutmann, & Hanson, 2008b; Kelly, 1963; Pike, 2003). Because this sample consisted of

adults in a higher education institution, the assumption is that many of the participants already have a higher level of knowledge. It seemed that the participants may have overlooked some of the named learning constructs because they felt that the task was too low level for them to have "agreed" to have learned it. Not only is age a limiting factor, but the fact that the participants were serious gamers leads to a conclusion that casual games would not be a major genre played.

Another limitation was that the study was exploratory. The data collected in the first part of this study were qualitative and the data were interpretive according to the sample group that was used. Different experts could essentially identify different element or constructs, since there was no real expert in the group of participants and no defined list of variables needed in the study.

Data collection was conducted via an online survey. The request for participation was sent out via email and the gaming club's forum post. Essentially, participants forwarded the email to others or repost the call for participation in a public forum. This limitation may potentially have skewed results by inviting other non-members of the target population to take the survey.

While being representative of the target population, the study's participants were predominantly male. This is contrary to other studies (American Psychiatric Association, 2007; Lenhart, Amanda et al., 2008; Shaffer et al., 2004) that say that video game players are closer to a middle split of male to female players as opposed to the 88% male to 12% female participation found in this study. Along with gender differences in the population, the study was conducted in the United States. It is entirely possible that other gamers from other nations would identify with playing other video game genres. It would be

prudent to investigate whether or not different gamers would identify different genres or learning constructs according to their geography.

Age was another limitation in this study. For one, the participants in this study were all adults which would mean that they are developmentally mature. On the other hand, a child playing a kinetic-controlled game or a casual game may technically be learning from those genres because they are still developing. The researcher also does not want to widely generalize that what has been learned by this target population is applicable to other video game playing age groups, such as children or teens.

Conclusions

The conclusions of this study addressed each of the research questions. They were derived from the data collected in the study with reviews of related literature. Game-based learning is a growing field of study. There are both proponents and opponents arguing about the benefits of playing video games. The purpose of this study was to explore the benefits of learning that occurs when playing video game genres as opposed to single video game titles. The conclusions aligned with both the results found for each research question as well as the established literature in this field.

This study explored video game genres as a potential tool for teaching. The findings of this study indicated that there are several major video game genres identified by video game players. Those video game players used in this study were considered to be educated, expert video game consumers. This study provided us with a list of twelve video game genres and their definitions. The video game genres identified were role-playing games (RPG), massively multiplayer online role-playing games (MMORPG),

first-person shooter (FPS), sports, puzzle, real-time strategy (RTS), action, turn-based, simulation, fighting, kinetic-controlled, and casual.

The research supported that video game players were learning different constructs from playing the identified video game genres. There were a total of 19 learning constructs identified and defined. The learning constructs were coding/computer programming, conflict management, communication skills, creating a community, crafting, critical thinking, attention to detail, building management, hand-eye coordination, how to be competitive, interpersonal skills, map awareness, conduct research, economics, reading comprehension, resource management, strategy, spatial thinking, and time management. Exploring learning constructs from playing video game genres provided a more generalized list of learning constructs. This comprehensive list of learning constructs could be used to test specific game titles or other sub video game genres.

The data in this study implies a few things. First, there is now a list of video game genres identified by gamers. No previous research sought to classify video game genres put together by pseudo video game playing experts. With this list of video game genres, it is possible to start looking at video game genres as the learning variable. As mentioned earlier in the statement of the problem, there are few studies that examined video game genres. The variable change of learning from specific game-based learning to instead learning from video game genres could prove to be more valuable in terms of study, since genres do not have a turnover or shelf life like single game titles do. It seems genre based learning would last longer since games are also limited by the system it was developed

for. With the study of genres, the learning that occurs in one game title should be applicable to other video game titles in the genre.

Finally, this study identified that all recognized video game genres taught at least one learning construct and in some cases all of the learning constructs. Using a video game genre may someday prove to be a good learning tool in teaching a specific learning construct. On the other hand, educators could take a learning construct and use several video game genres to teach it. The combination of using the RepGrid approach allowed the researcher to develop rich comparisons between video game genres in terms of learning constructs. Looking at it from the learning construct point of view, learning constructs could be readily learned by playing video games with certain learning constructs mapping to certain video game genres.

The implications of what has been learned from playing video game genres could affect other groups too. This study mentions that educators could use that information to enhance instruction to their students. The main point being that learning that occurs when playing video game genres could also be used as a tool to teaching those learning constructs. There has recently been a call for technology curriculum that pique student interests and increases their motivation. The researcher feels that teaching through video game genres and proper instructor training has the potential to be that effective learning technology that enhances learning. Students would be encouraged to become more proactive in their own learning since video game playing is an activity most of them already enjoy and partake in.

On a related note, game developers could also use results from this study on video game genre based learning when developing video game titles. In order to develop a

successful game title, game developers have to find that balance in a game that makes it challenging enough to keep the gamer interested without it being too easy that the gamer will get bored. The game developer could examine which learning constructs are found in a specific genre and develop a video game that engages a gamer's learning senses to keep the game challenging and enjoyable. If a developer develops a game that involves more of the learning constructs, they are ultimately creating a game that essentially makes the game more fun, memorable, and exciting to play.

The importance of learning from video game genres effects the educational technology degree because it could help transform learning by improving existing ways of teaching. The students of today are learners that have grown up with the technology, but it seems that the education system has not made the necessary changes to keep up with the technology evolution. Many of the modern day schools still use 19th century techniques in their teaching such as textbooks, chalkboards, and all-day lectures. Educational technologists have been pressing the educational systems that technology could effectively improve the educational experience. Our field believes that schools, administrators, and departments of education need to embrace the potential behind new learning technologies such as video games, smart boards, tablets, and so forth. Although technology is not the only answer, it could be one of the catalysts for change in technology enhanced instruction.

This study addresses one of those opportunities for change. Using video game genres for instruction could rapidly affect a student's learning process. Video game playing is a technology medium that requires students to be engaged, motivated, and immersed into problem solving opportunities while playing them. Thus, the information

and results gathered in the study is a means to help change the face of technology enhanced curriculum. Game-based learning is a fast growing field, but genre-based learning is in its infancy and requires more studies to help make a significant impact in the education paradigm shift. The developed educational technology tool (Figure 24) can empower educators to utilize and encourage their learners to become proactive in their learning by using genre based learning as a means to enhance instruction. New technologies, like video genre based learning, creates curriculum that allows students to experience and learn in ways never imagined, while replacing obsolete methods of instruction currently found in our education systems.

Closing Comments

The literature surrounding video game genres was scarce in video game-based learning. This exploratory study sought to identify twelve video game genres and nineteen learning constructs from playing video games. In addition to identifying and defining different game genres and learning constructs, a table (Figure 23) was developed to clearly map out which video game genres were able to teach any of the learning constructs. Overall, this table displays which video game genres map to which learning constructs as well as identifying which learning constructs were taught for one or more of the identified genres. Future research needs to build and expand on these findings to add to the new topic of video game genre based learning.

In conclusion, this research provides a framework for educators that want to use video games as another learning tool in their classrooms. This framework provides a guide for evaluating different video game genres, assessing each genre as it relates to one

or more learning constructs and integrating these genres into classroom curricula. By understanding the intricacies of video game genres and learning constructs as defined in this study, educators would be more prepared to make educated, student-centered decisions when selecting and incorporating video games into their curriculum. In addition, the findings of this study lend themselves to furthering the body of knowledge in video game research with the hopes of confirming the assertion that video games can be a principal tool for teaching and learning in the 21st century.

APPENDIX A: SEED QUESTIONS FOR FOCUS GROUP INTERVIEWS

List all the video game genres (elements) you can identify? What are the main genres?

Are there any subgenres?

Define all of the video game genres identified.

What have you perceived to have learned (learning construct) from playing each video game genre (element)?

Define all of the learning constructs identified.

With the identification of that perceived learning construct, are we able to identify these constructs on a scale? (e.g. strongly agree to strongly disagree) What should the measure look like

You have <number> types of video game genres (elements). Which ones are alike for you?

How are some of the listed video game genres (elements) not associated with the other genres? How exactly are they different?

APPENDIX B: SEED QUESTIONS FOR ONE-ON-ONE INTERVIEWS

Are you comfortable with the results identified and defined by your focus group on video game genres (elements)?

Are you comfortable with the results from your focus group on the identified and defined learning constructs?

Are there any video game genres (elements) identified by your focus group, that you would add? Why?

Are there any video game genres (elements) identified by your focus group, that you would remove? Why?

Are there any video game genres (elements) that you feel should be a subgenre of another video game genre?

Were there any learning constructs you would have left out?

Were there any learning constructs you would have added in?

Which of the video game genres are similar to you? In which way?

Why are some video game genres not similar with other video game genres?

Your small group identified <number> elements as more important to list? Why do you think it's important?

Did you learn these elements in school, did you learn it from video game playing, or was it from life experiences? Please elaborate.

APPENDIX C: DEMOGRAPHIC SURVEY

What is your gender?

What is your age?

What is the highest level of education you've completed?

Which video game platform(s) do you use for gaming?

Do you consider yourself a _____. <type of video game player>

How many years have you considered yourself a gamer?

Do you prefer to? <purchasing video game preferences>

Are you a video game developer?

How would you describe your current employment status?

If you are employed, what is your occupation? <optional>

Choose the type of gameplay you most prefer. <Solo versus with others>

Have you made friends through playing video games?

APPENDIX D: REPGRID TEMPLATE

ELEMENT Identification and Definition

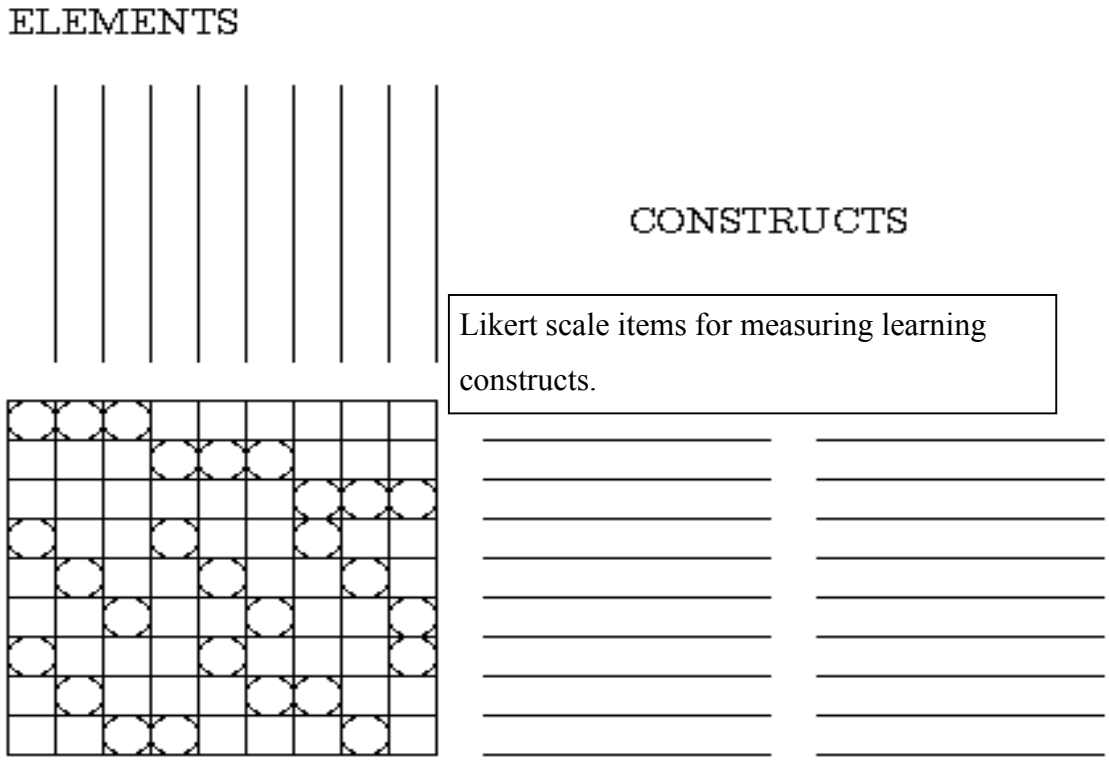
1. Element Identified:
    a. Element Definition:
    b. Examples:
2. Element Identified:
    a. Element Definition:
    b. Examples:
3. Element Identified:
    a. Element Definition:
    b. Examples:
4. Element Identified:
    a. Element Definition:
    b. Examples:
5. Element Identified:
    a. Element Definition:
    b. Examples:
6. Element Identified:
    a. Element Definition:
    b. Examples:
7. Element Identified:
    a. Element Definition:
    b. Examples:

LEARNING CONSTRUCT Identification and Definition

1. Learning Construct Identified:
    a. Learning Construct Defined:
2. Learning Construct Identified:

a. Learning Construct Defined:

3. Learning Construct Identified:
    a. Learning Construct Defined:
4. Learning Construct Identified:
    a. Learning Construct Defined:
5. Learning Construct Identified:
    a. Learning Construct Defined:
6. Learning Construct Identified:
    a. Learning Construct Defined:
7. Learning Construct Identified:
    a. Learning Construct Defined:
8. Learning Construct Identified:
    a. Learning Construct Defined:



REFERENCES

All Games - Electronic Arts - EA. (2012). *All EA Games*. Video Game Product Site. Retrieved October 8, 2012, from http://www.ea.com/games

American Psychiatric Association. (2007). American Psychiatric Association Considers "Video Game Addiction." *ScienceDaily*. Retrieved October 1, 2012, from http://www.sciencedaily.com/releases/2007/06/070625133354.htm

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology*, *78*(4), 772.

Anderson, J. (1983). Features: Who Really Invented The Video Game? *Creative Computing Video & Arcade Games*, *1*(1), 8.

Anderson, J., & Barnett, M. (2011). Using Video Games to Support Pre-Service Elementary Teachers Learning of Basic Physics Principles. *Journal of Science Education & Technology*, *20*(4), 347–362.

Bailey, B. W., & McInnis, K. (2011). Energy Cost of Exergaming: A Comparison of the Energy Cost of 6 Forms of Exergaming</subtitle>. *Archives of Pediatrics & Adolescent Medicine*, *165*(7), 597. doi:10.1001/archpediatrics.2011.15

Bailey, K., West, R., & Anderson, C. A. (2010). A negative association between video game experience and proactive cognitive control. *Psychophysiology*, *47*(1), 34–42.

Barlett, C. P., Harris, R. J., & Bruey, C. (2008). The effect of the amount of blood in a violent video game on aggression, hostility, and arousal. *Journal of Experimental Social Psychology*, *44*(3), 539–546. doi:10.1016/j.jesp.2007.10.003

Bellis, M. (2012). The History of Computer and Video Games. Retrieved September 28, 2012, from http://inventors.about.com/library/inventors/blcomputer_videogames.htm

Brookhaven National Laboratory. (n.d.). The First Video Game? Retrieved September 28, 2012, from http://www.bnl.gov/bnlweb/history/higinbotham.asp

Bryant, A., & Charmaz, K. (2010). *The SAGE Handbook of Grounded Theory*. SAGE Publications.

Caldwell, N. (2004). Theoretical frameworks for analysing turn-based computer strategy games. *Media International Australia Incorporating Culture & Policy*, *110*, 42–51.

Carey, M. A., & Smith, M. W. (1994). Capturing the Group Effect in Focus Groups: A Special Concern in Analysis. *Qualitative Health Research*, *4*(1), 123–127. doi:10.1177/104973239400400108

Castells, M. (2011). *The Rise of the Network Society: The Information Age: Economy, Society, and Culture, Volume I (The Rise of Network Society #1)* (1st ed., Vols. 1-3). John Wiley & Sons. Retrieved from

http://books.google.com.eres.library.manoa.hawaii.edu/books?hl=en&lr=&id=Fihjywtj TdUC&oi=fnd&pg=PT15&dq=information+age&ots=l1Xs4QGUf3&sig=e2xWB4fKGUADMIrihBC5Hyfaks0#v=onepage&q=information%20age&f=false

Chamorrow-Premuzic, T., & PopCap Games, Inc. (2011). *PopCap Study in Partnership with Goldsmiths University* (National Release). UK: Goldsmiths University. Retrieved from http://www.bizjournals.com/prnewswire/press_releases/2011/08/18/UKM575

Chazerand, P., & Geeroms, C. (2008). The business of playing games: players as developers and entrepreneurs. *Digital Creativity*, *19*(3), 185–193. doi:10.1080/14626260802312616

Corbit, M. (2005). Moving into Cyberspace: Game Worlds for Learning. *Knowledge Quest*, *34*(1), 18–22.

Creswell, J. (2008). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (3rd ed.). SAGE Publications.

Creswell, J., Clark, J., Gutmann, V., & Hanson, W. (2008a). An expanded typology for classifying mixed methods research into designs. *The Mixed Methods Reader*, 159–196.

Creswell, J., Clark, J., Gutmann, V., & Hanson, W. (2008b). An expanded typology for classifying mixed methods research into designs. *The Mixed Methods Reader*, 159–196.

Daniel, J. (2011). *Sampling Essentials: Practical Guidelines for Making Sampling Choices*. SAGE Publications.

De Aguilera, M., & Mendiz, A. (2003). Video games and education:Education in the Face of a "Parallel School." *Computers in Entertainment (CIE)*, *1*(1), 1.

Devers, K. J. (2011). Qualitative Methods in Health Services and Management Research: Pockets of Excellence and Progress, but Still a Long Way to Go. *Medical Care Research and Review*, *68*(1), 41–48. doi:10.1177/1077558710384269

DFC Intelligence: DFC Intelligence Forecasts Worldwide Online Game Market to Reach $79 Billion by 2017. (n.d.). Retrieved April 11, 2014, from http://www.dfcint.com/wp/?p=353

Dopamine Functionsadded. (n.d.). Retrieved October 1, 2012, from http://www.news-medical.net/health/Dopamine-Functions.aspx

Dunbar, G., Hill, R., & Lewis, V. (2001). Children's attentional skills and road behavior. *Journal of Experimental Psychology: Applied*, *7*(3), 227–234. doi:10.1037//1076-898X.7.3.227

Dye, M., Green, S., & Bavelier, D. (2009). Increasing Speed of Processing With Action Video Games. *Current Directions in Psychological Science*, *18*(6), 321–326. doi:10.1111/j.1467-8721.2009.01660.x.

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 532–550.

Entertainment Software Association. (2007). 2007 sales, demographic and usage data: Essential facts about the computer and video game industry.Essential Facts About

the Computer and Video Game Industry. *Quality Engineering*. Retrieved September 28, 2012, from http://www.tandfonline.com/doi/abs/10.1080/08982110108918656

Ferguson, C. (2007). Evidence for publication bias in video game violence effects literature: A meta-analytic review. *Aggression and Violent Behavior*, *12*(4), 470–482.

Ferguson, C. J., & Rueda, S. M. (2010). The Hitman Study. *European Psychologist*, *15*(2), 99–108. doi:10.1027/1016-9040/a000010

Ferguson, C. J., Rueda, S. M., Cruz, A. M., Ferguson, D. E., Fritz, S., & Smith, S. M. (2008). Violent Video Games and Aggression: Causal Relationship or Byproduct of Family Violence and Intrinsic Violence Motivation? *Criminal Justice and Behavior*, *35*(3), 311–332. doi:10.1177/0093854807311719

Fery, Y.-A., & Ponserre, S. (2001). Enhancing the control of force in putting by video game training. *Ergonomics*, *44*(12), 1025–1037. doi:10.1080/00140130110084773

Fromm, M. (2004). *Introduction to the Repertory Grid Interview*. Waxmann Verlag.

Galarneau, L. (2005). Spontaneous communities of learning: Learning ecosystems in massively multiplayer online gaming environments. *Available at SSRN 810064*. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=810064

Gee, J. P. (2003). What video games have to teach us about learning and literacy. *Computers in Entertainment (CIE)*, *1*(1), 20–20.

Gee, J. P. (2007a). *Good Video Games and Good Learning* (1st ed.). Peter Lang Publishing.

Gee, J. P. (2007b). *What Video Games Have to Teach Us About Learning and Literacy* (2nd ed.). Palgrave Macmillan.

Gee, J. P. (2007c). *What Video Games Have to Teach Us About Learning and Literacy.* (2nd ed.). Palgrave Macmillan.

Gopher, D., Well, M., & Bareket, T. (1994). Transfer of Skill from a Computer Game Trainer to Flight. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *36*(3), 387–405.

Graf, D., Pratt, L. V., Hester, C. N., & Short, K. R. (2009). Playing Active Video Games Increases Energy Expenditure in Children. *Pediatrics*. Retrieved from http://pediatrics.aappublications.org.eres.library.manoa.hawaii.edu/content/124/2/534.full.pdf+html

Granek, J., Gorbetemail, D., & Sergio, L. (2010). Extensive video-game experience alters cortical networks for complex visuomotor transformations. *Cortex*, *46*(9), 1165–1177.

Green, C. S., Pouget, A., & Bavelier, D. (2010). Improved Probabilistic Inference as a General Learning Mechanism with Action Video Games. *Current Biology*, *20*(17), 1573–1579. doi:10.1016/j.cub.2010.07.040

Griffiths, M. D., & Hunt, N. (1998). Dependence on computer games by adolescents. *Psychological Reports*, *82*(2), 475–480.

Gros, B. (2007). Digital games in education: The design of games-based learning environments. *Journal of Research on Technology in Education*, *40*(1), 23.

Hare, D. J., Searson, R., & Knowles, R. (2011). Real listening - using personal construct assessment with people with intellectual disabilities: two case studies. *British Journal of Learning Disabilities*, *39*(3), 190–197. doi:10.1111/j.1468-3156.2010.00650.x

Hoeft, F., Watson, C. L., Kesler, S. R., Bettinger, K. E., & Reiss, A. L. (2008). Gender differences in the mesocorticolimbic system during computer game-play. *Journal of Psychiatric Research*, *42*(4), 253–258. doi:10.1016/j.jpsychires.2007.11.010

Honey, P. (1979). The repertory grid in action. *Industrial and Commercial Training*, *11*(11), 452–459.

Huberman, M., & Miles, M. B. (2002). *The Qualitative Researcher's Companion* (1st ed.). SAGE Publications.

Information Age - Wikipedia, the free encyclopedia. (n.d.). Retrieved September 28, 2012, from http://en.wikipedia.org/wiki/Information_Age

Jackson, L. A., Witt, E. A., Games, A. I., Fitzgerald, H. E., von Eye, A., & Zhao, Y. (2012). Information technology use and creativity: Findings from the Children and Technology Project. *Computers in Human Behavior*, *28*(2), 370–376. doi:10.1016/j.chb.2011.10.006

Jaeger, S. R., & Meiselman, H. L. (2004). Perceptions of meal convenience: the case of at-home evening meals. *Appetite*, *42*(3), 317–325. doi:10.1016/j.appet.2004.01.005

Jenkins, H., Klopfer, E., Squire, K., & Tan, P. (2003). Entering the education arcade. *Computers in Entertainment (CIE)*, *1*(1), 8.

Jones, H., & Jankowicz, A. D. (1998). Bringing two worlds together: personal and management development in the Health Service. *Human Resource Development International*, *1*(3), 342–346.

Kelly, G. (1963). *A Theory of Personality: The Psychology of Personal Constructs*. W. W. Norton & Company.

Kreber, C., Castleden, H., Erfani, N., Lim, J., & Wright, T. (2003). Exploring the usefulness of Kelly's Personal Construct Theory in assessing student learning in science courses. *Teaching in Higher Education*, *8*(3), 431–445.

Lenhart, Amanda, Kahne, J., Middaugh, E., Macgill, A., Evans, C., & Vitak, J. (2008, September 16). Teens, Video Games, and Civics: Teens' gaming experiences are diverse and include significant social interaction and civic engagement. Pew Internet & American Life Project. Retrieved from http://www.pewinternet.org/~/media/Files/Reports/2008/PIP_Teens_Games_and_Civics_Report_FINAL.pdf.pdf

Li, R., Polat, U., Makous, W., & Bavelier, D. (2009). Enhancing the contrast sensitivity function through action video game training. *Natural Neuroscience*, *12*(5), 549–551. doi:10.1038/nn.2296

Mangan, K. (2005). Joysticks in the Classroom: Game-Design Programs Take Off. *Chronical of Higher Education*, *51*(22), A29 – A31.

Mayo, M. J. (2007). Games for science and engineering education. *Communications of the ACM*, *50*(7), 30–35.

Merriam, S. (2009). *Qualitative Research: A Guide to Design and Implementation* (3rd ed.). Jossey-Bass.

Mesolimbic pathway - Wikipedia, the free encyclopedia. (n.d.). Retrieved October 1, 2012, from http://en.wikipedia.org/wiki/Mesolimbic_pathway

Michaels, J. (1993). Patterns of video gameplay in parlors as a function of endogenous and exogenous factors. *Youth and Society*, *25*(25), 272–289.

Mitchell, E. (1985). The dynamics of family interaction around home video games. *Marriage & Family Review*, *8*(1-2), 121–135.

Olson, C. K. (2004). Media violence research and youth violence data: why do they conflict? *Academic Psychiatry*, *28*(2), 144–150.

Patton, M. Q. (2001). *Qualitative Research & Evaluation Methods* (3rd ed.). SAGE Publications.

Peever, N., Johnson, D., & Gardner, J. (2012). Personality & video game genre preferences. In *Proceedings of The 8th Australasian Conference on Interactive Entertainment: Playing the System* (p. 20). Retrieved from http://dl.acm.org/citation.cfm?id=2336747

Pike, S. (2003). The Use of Repertory Grid Analysis to Elicit Salient Short-Break Holiday Destination Attributes in New Zealand. *Journal of Travel Research*, *41*(3), 315–319. doi:10.1177/0047287502239054

Pink, D. (2006). *A Whole New Mind: Why Right-Brainers Will Rule the Future*. Penguin. Retrieved from http://books.google.com.eres.library.manoa.hawaii.edu/books?id=3Xb_MDJQZnYC&printsec=frontcover&dq=daniel+pink&source=bl&ots=MbzSavKFOW&sig=krPP0WnEj-eaRsTwclusth4Z1sA&hl=en&sa=X&ei=iIllUN3pLITXigKg44C4Cg&ved=0CDUQ6AEwAQ#v=onepage&q=daniel%20pink&f=false

Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment (CIE)*, *1*(1), 21–21.

Rosser, J., Lynch, P., Cuddihy, L., Gentile, D., Klonsky, J., & Merrell, R. (2007). The impact of video games in surgical training. *Archives of Surgery*, *142*, 181–186.

Russoniello, C. V., O'Brien, K., & Parks, J. M. (2009). EEG, HRV and Psychological Correlates while Playing Bejeweled II: A Randomized Controlled Study. *Annual Review of Cybertherapy and Telemedicine*, *144*, 189–192.

Shaffer, D., Squire, K., Halverson, R., & Gee, J. P. (2004, December). Video games and the future of learning. Retrieved from http://www.cwrl.utexas.edu/currents/fall05/payne.html

Shih, J.-L., Chu, H.-C., Hwang, G.-J., & Kinshuk. (2011). An investigation of attitudes of students and teachers about participating in a context-aware ubiquitous learning

activity. *British Journal of Educational Technology*, *42*(3), 373–394. doi:10.1111/j.1467-8535.2009.01020.x

Sitzman, T. (2011). A Meta-Analytic Examination of the Instructional Effectiveness of Computer-Based Simulation Games. *Personnel Psychology*, *64*(2), 489–528.

Squire, K. (2011). *Video Games and Learning: Teaching and Participatory Culture in the Digital Age*. Teachers College Press.

Steinkuehler, C. A. (2004). Learning in massively multiplayer online games. In *Proceedings of the 6th international conference on Learning sciences* (pp. 521–528). Retrieved from http://dl.acm.org/citation.cfm?id=1149190

Sternheimer, K. (2007). Do video games kill?□:When white, middle-class teens kill, the media and politicians are quick to blame video games. Are they right? *Contexts*, *6*(1), 13–17.

Tan, F., & Hunter, M. (2002). The Repertory Grid Technique: A Method for the Study of Cognition in Information Systems. *MIS Quarterly*, *26*(1), 39–57.

The Entertainment Software Association - Industry Facts. (2012). Retrieved September 28, 2012, from http://www.theesa.com/facts/index.asp

Understanding Personal Construct Theory - George Kelly. (n.d.). Retrieved May 3, 2011, from http://www.enquirewithin.co.nz/HINTS/skills2.htm

Van Eck, R. (2006). Digital subgenre learning: It's not just the digital natives who are restless. *EDUCAUSE Review*, *41*(2), 16.

Video game genres. (n.d.). *Video Game Genres*. Wikipedia. Retrieved October 8, 2012, from http://en.wikipedia.org/wiki/Video_game_genres

Weber, R. P. (1990). *Basic Content Analysis* (2nd ed.). SAGE Publications.

Wenger, E. (1999). *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press. Retrieved from http://books.google.com.eres.library.manoa.hawaii.edu/books?id=heBZpgYUKdAC&dq=wenger+communities+of+practice&lr=&source=gbs_navlinks_s