2-2-2015

The Phenomenological Exploration of Constructionism Among Female Undergraduate Communications Media Students When Designing a 2D Game Interface

Christopher W. Juengel
Indiana University of Pennsylvania

THE PHENOMENOLOGICAL EXPLORATION OF CONSTRUCTIONISM AMONG FEMALE UNDERGRADUATE COMMUNICATIONS MEDIA STUDENTS WHEN DESIGNING A 2D GAME INTERFACE

A Dissertation

Submitted to the School of Graduate Studies and Research

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Philosophy

Christopher W. Juengel

Indiana University of Pennsylvania

December 2014

Indiana University of Pennsylvania
School of Graduate Studies and Research
Department of Communications Media

We hereby approve the dissertation of

Christopher W. Juengel

Candidate for the degree of Doctor of Philosophy

_____ _____
Luis Almeida, Ph.D.
Associate Professor of Communications Media, Advisor

_____ _____
B. Gail Wilson, Ed.D.
Professor of Communications Media

_____ _____
Jeffery A. Ritchey, Ph.D.
Associate Professor of Adult & Community Education

ACCEPTED

_____ _____
Timothy P. Mack, Ph.D.
Dean
School of Graduate Studies and Research

Title: The Phenomenological Exploration of Constructionism Among Female Undergraduate Communications Media Students When Designing a 2D Game Interface

Author: Christopher W. Juengel

Dissertation Chair: Dr. Luis Almeida

Dissertation Committee Members: Dr. B. Gail Wilson
Dr. Jeffery A. Ritchey

The purpose of this qualitative dissertation was to capture the lived experiences of six female undergraduate students majoring in communications media when constructing a 2D game interface. This study provides real world accounts of the students' experiences designing and developing a game interface in a social constructionist environment without the presence of an instructor. This research study asked three main questions, which where: What are the lived experiences of female students as they design their own 2D game interfaces under the lens of constructionism? What evidence is there that the inclusion of a female population will hinder or support the current trend of utilizing game design as a method to test social constructionism? How do the processes of constructionism in the cases explored diverge or support the use of game design as a vehicle for constructionism in the classroom and in the industry?

Over a six week period, a phenomenological approach was used to explore the lived experiences of six female students as they constructed a 2D game interface under the lens of social constructionism. The data was collected through participant observation, focus group interview sessions and artifact analysis. The constant comparative method of data analysis was used to review and reflect upon the data. In addition, method process of moving from condensed meaning units to themes was employed. Microsoft Word, Excel and Nvivo were utilized as organizing tools to assist with the coding, analyzing and interpreting of the data. In order to

strengthen the trustworthiness of this study, thick description, reflection on and critique of researcher biases and member checking were all utilized.

Five themes emerged from this study: social constructionism brings equal gender representation awareness; social constructionism generates goal identification and identity awareness; social constructionism is empowering; social constructionism is challenging; and interaction is not an essential component of social constructionism.

ACKNOWLEDGEMENTS

This dissertation is dedicated to my parents, grandparents, as well as the rest of family because without their encouragement, support and unyielding faith in me, I would have never made it this far. I would also like to thank Dr. Luis Almeida for his guidance and constant encouragement through this entire process. His excitement and overwhelmingly positive attitude was always the shot in the arm I needed on those long days writing and made me excited to see this project completed. Thank you to Dr. B. Gail Wilson for always being there to triple check everything and ensuring that I was staying on track throughout the entire process. She was always there whenever I had questions that needed answering. And lastly, thank you to Dr. Jeff Ritchey for all your help and guidance, even during the toughest moments of this process. And thank you for all the great conversations that we shared not only about my topic but the field as well.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Video games today represent one of the most profitable and influential forms of entertainment within the United States (Siwek, 2010). The average household now contains at least one device dedicated to gaming (ESA, 2012). Within the educational system, video games are now being integrated as learning and motivational tools, used to engage students with topics where their use had previously been dismissed as irrelevant or unimportant, such as engineering, physics or computer science. However, despite the proliferation of video games within our culture, the majority of attention, both within the industry and academia, has been focused on understanding the perspectives and experiences of male players, often leaving female players to be generalized or outright ignored (Kafai, 2008). This mentality is surprising considering that female players make up almost half of the general gaming population (ESA, 2012).

In reality, these trends are not peculiar. Female players have often gone relativity unnoticed by the industry since its inception. The majority of the marketing and even the design of video games has been specifically targeted to traits and interests that are typically associated with male audiences (Denner, Bean, & Werner, 2005; Thornham, 2008) with any focus on a female audience often being generalized to the production of "girl" products such a pink consoles or accessories (Royse et al., 2007). Because of this, females often find themselves generalized to one overarching demographic, based solely on their gender (Kafai, 2008). This lack of representation is also prevalent within the design and production of games, with less than 5% of game designers being female (Thornham, 2008), and many of these report facing discrimination and difficulty gaining entry within the industry (Brar, 2012).

Within academia, video games have rapidly transitioned from a simple reward system into an integral part of introducing alternative methods of learning. Researchers such as Almeida (2008) and Kafai (2008) view video games as an opportunity to allow a shift in the power dynamics within classrooms by allowing the learners to have greater control in their own learning. Through the use and design of video games, instructors are able to move away from traditional instructionist methods, and begin focusing on integrating more learner centered methods such as user design, constructivism and social constructionism (Almeida, 2008). By integrating these methodologies with game design, learners have shown an increase in motivation, engagement, and participation within the classroom (Moreno-Ger et al., 2008; Overmars, 2004; Dondlinger, 2007), as well as increased interest in pursuing additional information about topics discussed in classroom (Gee, 2003).

However, despite this increased presence within the classroom, the majority of research addressing the integration of video games within the classroom has been rather limited (Gee, 2007). Much of the previous research has been directed towards determining if videos games are better than traditional instructional methods (Squire, 2003), with very little research focused on how to successfully integrate games within the classroom (Moreno-Ger et al., 2008). In addition, much of previous research has been based in K-12 classrooms, with a very limited number of studies investigating higher education populations (Kafai, 2006). Lastly, the research shows the alarming trend of an almost non-existent population of female students within these studies (Flanagan; 2005). If an understanding is to be gained as to why there exists such a disconnect between female game players and designers, both within the industry and academia, it is essential to explore the experiences of female game designers.

Need for the Study

The majority of studies involving females and game design remain inconclusive (Ray, 2004) because they have been focused on game content or gameplay and not on the construction of knowledge (Denner, Bean, & Werner, 2005). Despite the overwhelming proliferation of video games in American culture (ESA, 2011), most companies are marketing and developing games almost exclusively for male players (Dickey, 2006) with only a few involving social constructionism as its theoretical construct. The former position, in fact, has been seen as pressing by Kafai (2007) who called for more interaction and feedback from fellow group learners when constructing artifacts, especially from a female perspective. This dissertation sought to fill the gap between the lack of constructionist research studies in instructional technology and the disconnect between research on females and video game construction (Papert, 1980; Terlecki et al., 2011) by allowing a group of female undergraduate students at Indiana University of Pennsylvania to socially construct their own game interfaces.

Statement of the Problem

To date, research on constructionist methods utilizing video game design has been limited (Denner, 2005). The majority of research involving constructionist methods within educational settings has excluded female learners (Terlecki et al., 2011). As a result, females have had little to no involvement in video game design (Denner, Bean, & Werner, 2005), when in fact, almost half of all game consumers are also females (ESA, 2012) and over 20% of the employees in the game industry are female (Thornham, 2008). Without an accurate understanding of the experiences of female game designers, it can be argued, games might continue to be designed for a male audience and perhaps the needs of females might continue to be ignored (Peppler & Kafai, 2007). This study attempted to explore this problem.

Purpose of the Study

The purpose of this study was to describe the lived experiences (Van Manen, 1998) of female undergraduate students majoring in communications media when constructing a 2D game interface. According to Flanagan (2005), the vast majority of constructionist based research studies to date have excluded females, despite the fact that females represent the majority of students in U.S. classrooms (Ray, 2004) and almost half of the total game consumer population (ESA, 2012).

Significance of the Study

The video game industry has undergone a radical transformation in the last thirty years, transitioning from novelty toys into one of the most profitable and pervasive forms of entertainment (Squire, 2003; Siwek, 2010). According to the Entertainment Software Association (ESA, 2012), females comprise over 47% of the general gaming population and over 55% of the casual, mobile and social gaming population (Brar, 2012). Nevertheless, fewer than 20% of all employees within the video game industry are female, with less than 3% of those employees being directly involved in the design of video game content (Thornham, 2008). To date, there has not been sufficient attention given to trying to understand this growing disconnect between female game players and game designers. It was the goal of this dissertation to investigate the perspectives and experiences of female video game designers in order to better understanding why females are continually marginalized in both the production and marketing of video games (Kafai, 2008).

The information in this dissertation could be useful to the video game industry, particularly to the marketing of games, because it provides a real world account of how female undergraduate students experienced the process of designing and creating their own game

content. This information could also provide an alternative view on the production and marketing of games from a female perspective and help to identify why such a disproportion exists between female players and designers (Denner, Bean, & Werner, 2005). In addition, this study addressed the frequent misrepresentations of women, both within the industry and in the content of the games themselves (Thornham, 2008; Brar, 2012).

Along with the economic potential, the information presented within this dissertation provided further context and understanding on how the lived experiences of socially constructed video game interfaces can assist in the adoption of constructionist and social constructionist methods within classroom settings (Almeida, 2008). By focusing on an exclusively female population this research further assisted in the implementation of constructionist and game design practices in classrooms by providing new insights and descriptions from a frequently underrepresented population (Carr-Chellman, 2007). In addition, the accounts reported in this study serve as a catalyst to encourage educational systems to further examine social constructionism and game design as viable methods of introducing topics such as math, engineering and computer science to female learners (Baytak & Land, 2011; Kafai, 2006).The results of this research study contribute to the knowledge base of constructivism, social constructionism, and the integration of game design as a method of educational reform.

Research Questions

In order to explore the lived experiences (Van Manen, 1998) of female undergraduate communications media students in designing their own 2D game interfaces, it was essential to uncover and report the processes in which females engage in constructivism and social constructionism.

The following questions were used to guide this research study:

RQ1: What are the lived experiences of female students as they design their own 2D game interfaces under the lens of constructionism?

RQ2: What evidence is there that the inclusion of a female population will hinder or support the current trend of utilizing game design as a method to test social constructionism?

RQ3: How do the processes of constructionism in the cases explored diverge or support the use of game design as a vehicle for constructionism in the classroom and in the industry?

In the following chapters this dissertation will explore the previous research and literature that provided the foundation for this study, focusing upon the backgrounds of social constructionism, game design and the role of women within the industry. Afterwards, Chapter Three will examine the methods and rationale used to conduct this study. Lastly, Chapters Four and Five will examine the results of the study as well as its possible implications upon the field.

CHAPTER 2

LITERATURE REVIEW

Introduction

This chapter serves as a review of past research and literature for this dissertation. The information presented was used to help further the argument that the research question was not only relevant for the instructional technology field but also a necessity if we are to understand social constructionism from a female's perspective. In addition, this study served as an opportunity to further explore the potentials of social constructionism as a method of constructing games and how to market and advise game companies on the marketing of games to female users.

Constructionism

Constructionism is a learning method that focuses on how individuals construct their own knowledge base (Ackerman, 2001). One such example is when math students are asked to construct a scale model bridge out of toothpicks. By allowing the students to design and test their own bridge, it serves as an introduction to engineering and physics and allows students to apply their experiences constructing the bridge to the concepts they will cover in the course. Papert (1991) states that through constructionism, learners can become better engaged in the learning process by taking information presented in class and giving it personal significance (Papert & Harel, 1991). By personalizing information, learners are then able to connect the information they gained to their own experiences, knowledge and interests (Ackerman, 2001). As a result, a new knowledge base is developed, helping learners create a greater understanding of the material presented. In fact, Alimisis (2007) argues that this method allows the learners to take ownership of their own work and encourages a greater level of engagement because the learners have now

created a personal connection to the information. Harris and Shelswell (2001) add that through constructionist methods, classrooms can also introduce concepts such as time management, troubleshooting, problem solving, self-efficacy and incidental learning. In fact, the former are concepts often used in the marketing and development of artifacts, which were indeed, the outcomes of this study.

Papert and Harel (1991) add that through the design, development and interaction of artifacts, learners can achieve a deeper level of immersion and interest in the classroom. These artifacts can range from building a model (Ackerman, 2001) to the creation of robotics or games (Floridi, 2004). By enabling learners to shift their focus towards learning through customization rather than standardization, students then are able to gain a greater sense of engagement because the learning has now become personal and more relevant to them (Reigeluth, 1999). Researchers such as Kafai (2006) believe that by integrating methods such as game design and social constructionism, female learners will be more encouraged to explore avenues of study that had previously been dismissed, such as mathematics or computer science.

Constructionists view learning as an ongoing process in which learners are continually engaged with the world around them (Ackermann, 2001). This engagement leads to a continuous stream of new concepts, knowledge, interactions and experiences (Kafai & Resnick, 1996). In fact, Papert and Harel (1991) state that both constructivists and constructionist view this as essential in shaping an individual's world view and knowledge base, allowing new knowledge and meanings to be constructed (Papert & Harel, 1991).

In summary, constructionism refutes the concept of a "magic bullet" in which a single method of instruction equally distributes knowledge to everyone in the exact same way (Kafai & Resnick, 1996). Instead, constructionism argues that learning can occur through a variety of

methods and approaches encouraging the use of different instructional methodologies rather than continually focusing on a single method (Kafai & Resnick, 1998) which in itself can be beneficial for female learners because it can introduce alternative methods of viewing problems and situations.

Constructionism Versus Constructivism

Papert's theory of constructionism is based upon the theoretical framework established by Piaget with his theory of constructivism (Brunger, 1996). Piaget states that learning is a continual and active process on the part of the learner (Jonassen et al., 1995) and that information is not passively absorbed by an individual; rather, it is constantly maintained and developed (Bednar et al., 1992) by incorporating new knowledge and information, leading to the development of their own meanings. In fact, personal meanings are developed through the culmination of an individual's experiences, background, culture, interactions, and perspectives (Papert & Harel, 1991). This culminated information is the basis for a newly formed knowledge base, which is comprised of personally meaningful information and experiences (Bednar et al., 1992; Papert & Harel, 1991). It was the purpose of this study to examine how female learners are able to apply their experiences and social interactions into the creation of their 2D game interfaces.

Social Constructionism

Social constructionism follows the same foundations and principals of constructionism, however, it argues that in order for the learning process to be successful the inclusion of teamwork, shared experiences and social interaction first need to occur (Beldarrian, 2006; Alimisis, 2007). Jonassen (1999) adds that it is through conversations, comparisons and collaboration that learners are able to take their own knowledge and share it with a community,

creating a larger body of knowledge. It is through this amalgamation of an individual's and a community's shared experiences that social constructionism is derived (Alimisis et al., 2007).

In addition, Bruckman (1998) states that social constructionism is most effective when a community uses the construction of artifacts as a "catalyst for social activity." These "social activities" actively engage and encourage the involvement of members of the community (Bruckman, 1998), through interaction and engagement, allowing learners to support and share knowledge more easily. In addition, as these individuals collaborate and share their work with each other, it generates a greater sense of encouragement and immersion throughout the learning process by creating a shared experience that is often considered more socially relevant (Harris & Shelswell, 2001).

In order to encourage the implementation of social constructionism in learning communities, theorists such as Cannings and Stagger (2003), Bruckman (1998), and Beldarrain (2006) have observed a variety of different mediums that can aid in this process. Bruckman (1998) argues that the Internet serves as one of the largest examples of social constructionism in use today. He states that the Internet itself acts as its' own community; one that can be used to effectively share, edit, and compile information among its users (Bruckman, 1998). Media outlets such as YouTube, Facebook and Wikipedia are all examples of how a community can collaborate and share information through extensive user generated and maintained databases (Beldarrain, 2006). By implementing similar constructionist approaches, such as the development of a classroom Wikipedia page, learners can continually modify and contribute to a shared knowledge database that will grow as each individual's own experiences and knowledge grow (Cannings & Stager, 2003; Beldarrain, 2006). It was the purpose of this study to examine

how a community of female game designers is able to collaborate and share information as they develop their own 2D game interface.

Constructionism in Education

According to Piaget, knowledge is more than a simple collection of information that can be recited, memorized, and then used (Ackermann, 2001). Instead, he argues that knowledge is the amalgamation of experiences that a learner gains from their culture, world views, interactions and situational context (Alimisis et al., 2007; Ackermann, 2001, pp. 3). However, the majority of educational systems tend to ignore constructionist methods in favor of the more traditional instructionist methods of teaching (Bers et al., 2002). As a result, instructors rely on repetition and memorization to develop a learner's knowledge base (Perrone, Clark, & Repenning, 1996).

However, opponents of instructionism argue that knowledge cannot be presented to learners as if it were a script, with the same facts and information continually repeated with no variance (Perrone et al., 1996). Bednar (1992) states that while instructionism has shown some success within educational systems, it is unable to fit into every learning situation. Instead, alternative methods such as constructivism or social constructionism could be implemented to aid instructors and their learners in the creation of new knowledge that surpasses the traditional instructionist method (Jonassen et al., 1995). It is through a constructionist approach that learning becomes less oriented toward memorization and repetition, and more about engaging learners through interactions and personally meaningful experiences (Alimisis et al., 2007). The challenge for both instructors and educational systems is to find the most effective method of introducing constructionist based learning into their classrooms.

In the past, instructors have explored multiple avenues to introduce constructionist methodologies within the classroom. However, recently there has emerged a significant trend

towards using technology such as computers, robotics, and video games to introduce constructionism within classrooms (Beldarrian, 2006). Bers et al. (2002, pp. 4-5) states that because technology is able to "engage the learners in applying concepts, skills, and strategies to solve real-world problems that are relevant and personally meaningful," it can effectively serve as a method of integrating constructionism into learning. Alimisis et al. (2007) adds that when content is considered personally meaningful and engaging, it can allow instructors to introduce concepts such as engineering, mathematics, mechanics, and science to their learners (Stager, 2005). This was particularly relevant to this study, because recent surveys have shown a decline in interest in computer programming, game design, mathematics and science among female learners (Kafai, 2006), which is something that this study plans to address.

Challenges of Integration

One of the greatest challenges facing educational systems is complacency. Bers (2002) has commented that a number of instructors have difficulty teaching through constructionism and that many instructors quickly return to the more traditional instructionist methods (Bers, 2002). Researchers, such as Bruckman (1998) and Bers (2002), associate this behavior to a lack of experience, training, or expertise in implementing new technologies within the classroom. Additionally, instructors can struggle at finding an effective means of integrating engaging learning techniques without completely removing their own interactions with the learners (Bers et al., 2002).

Another reoccurring issue is that the majority of research has focused upon K-12 populations (Harris & Shelswell, 2001), and that there has been little effort to examine if the same principles of constructionism can be applied successfully to adult learners in higher education (Harris & Shelswell, 2001). Harris and Shelswell (2001) state that researchers need to

avoid focusing upon comparing the performances of instructionist and constructionist based learners because the purpose of constructionist methods is to generate greater interest, interaction and engagement within classroom (Harris & Shelswell, 2001) and not provide a vehicle to compare academic performance.

Problem-Based Learning

Problem based learning (PBL) derives from a theory which suggests that for effective acquisition

> of knowledge to occur, learners need to be stimulated to restructure information they already know within a realistic context, to gain new knowledge, and to then elaborate on the new information they have learned, for example by teaching it to peers or by discussing the material in a group setting. (Kilroy, 2004)

What Is Problem-Based Learning?

Problem based learning (PBL) is an instructional method in which learners acquire new knowledge through the application of problem solving and self-reflection (Hmelo-Silver & Barrows, 2006; Barrows & Tamblyn, 1980). Leading researchers, such as Simons and Ertmer (2005), consider PBL to be a combination of problem solving, case studies, and constructionist methods (Hung, Jonassen, & Liu, 2008). The goal of PBL is to further the learner's level of knowledge and understanding by requiring learners to solve problems based upon a context that is considered personally meaningful and engaging (Hung et al., 2008).

PBL relies upon an instructor to introduce a problem or situation which the learners must overcome (Kuruganti, Needham, & Zundel, 2012). However, unlike traditional instruction where learners encounter the problem after they have reviewed the material with their instructor (Barrows & Tablyn, 1980), PBL requires that the learners are given the problem before the material has been reviewed (Barrows, 1986; Hung et al., 2008). Instead, the learners must make

use of their own pre-established skills, knowledge, and experiences to build a solution (Kuruganti et al., 2012). In addition, the learners must integrate self-efficacy to direct their learning by seeking out and using the necessary information to overcome the problem (Hyeon Woo, 2012; Kilroy, 2004). Hung et al. (2008) add that the learners must practice self-reflection, which will allow them to monitor and review their own progress, while making changes when necessary (Hung et al., 2008). These skills are essential concepts that are frequently used in the marketing and development of artifacts at various levels of production, and were practiced by the participants of this study.

After the instructor has supplied a problem to overcome, the instructor's role then shifts to that of a facilitator (Hung et al., 2008). As facilitators, they no longer supply the leaners with additional content or information. Instead they serve the learners by providing support, assisting in troubleshooting (Hyeon Woo, 2012), facilitating interaction and collaboration (Barrows & Tamblyn, 1996), encouraging learners to ask questions among themselves (Hmelo-Silver & Barrows, 2006), and furthering cognitive apprenticeship (Kilroy, 2004). This approach is similar to user design-based methods, in which the learners are given more direct control over their own learning. Through PBL, instructors no longer dictate the learning process (Barrows, 1986), but instead guide and support the learners' creation of new knowledge (Hung et al., 2008).

PBL's Origins

Since the 1950s, educators have been utilizing PBL in a variety of classroom settings (Barrow, 1986). However, PBL was first used by educators as a response to the frequent criticisms placed against medical students and their instructors (Hung et al., 2008). While the medical students appeared well-versed and performed well on written examinations; they showed difficulty in applying the content in real world situations (Schmidt, 1983). Researchers

such as Barrows (1986) discovered that their instruction focused predominantly on the learners' ability to memorize content and knowledge (Barrows, 1986), and less on problem solving and application. While this form of instructionism worked well in a traditional academic setting, it failed to support the learners as they attempted to use their knowledge to identify and solve problems in real-world situations (Barrows, 1986). To address the problems caused by the traditional instructionist method, educators began focusing on developing the learner's ability to analyze a problem (Hmelo-Silver & Barrows, 2006), and then utilize self-efficacy, critical thinking and problem solving to determine the best method to solve the problem (Othman & Ahamad Shah, 2013).

Despite PBL's origins being based in medical instruction, its success soon led to its adoption in numerous educational institutions throughout the 1980s (Schmidt, 1983), which Hung et al. (2008) attribute to three major factors. First, PBL was effective in a wide variety of fields and topic areas, such as language, business, engineering and mathematics. Second, PBL was frequently observed as being effective in numerous populations and settings, including urban and rural educational systems. Third, PBL showed a significant level of positive response from a diverse range of student populations, including K-12, higher education and gifted students (Hung et al., 2008).

PBL, Constructivism and Constructionism

Many of the tenants that formed the foundations of PBL are shared by both constructivism and constructionism making them relevant for this doctoral dissertation. This includes the idea that knowledge is not created through the simple transmission of information from one individual to another (Papert & Harel, 1991) but instead through interactions (Savery & Duffy, 1995), experiences, and content considered relevant and personally meaningful to an

individual (Ackermann, 2001). PBL, constructionism, and constructivism encourage learners to construct knowledge based upon their own experiences, background, culture and community (Savery & Duffy, 1995; Kafai & Resnick, 1996) in order to create content that has greater personal significance and meaning (Savery & Duffy, 1995). When the content has a greater personal connection with the learner, it will allow for further immersion and engagement within the classroom (Ackermann, 2001).

In addition, PBL shares connections with social constructionism (Simons & Ertmer, 2005) because the majority of researchers encourage the use of groups or social communities for knowledge building (Hyeon Woo, 2012; Alimisis et al., 2007). Beldarrain (2006), and Savery and Duffy (1995) support the use of social interaction within learning because it enables learners to incorporate other viewpoints, information and different levels of understanding into their own attempts at solving the problem or building knowledge. However, Barrows (1986) and Hyeon Woo (2012) argue that if PBL is going to remain an effective tool for education, there are several elements that must be actively included and maintained, such as insuring the problems presented in class can properly engage and motivate the learners (Hyeon Woo, 2012). Well-designed PBL assignments should encourage learners to actively seek out the necessary information and materials required to solve the problem without pressure from the instructor. The quality and authenticity of the problem is essential if it is going to engage and motivate the learners (Othman & Ahamad Shah, 2013). The learners should feel that the problem is relevant and is applicable to their future (Schmidt, 1983), allowing the learners to explore multiple avenues and provide them the opportunity for more than one correct response (Hyeon Woo, 2012). Doing so will allow the learners to engage in critical thinking and provide them the opportunity to defend their rationale and methods (Hyeon Woo, 2012). It was through similar processes that the female subjects of

this dissertation were asked to engage in the creation of their own 2D game interface, using content and materials that they considered engaging and personally relevant.

Previous PBL Research

The educational applications of PBL have been consistently researched since the theory's inception in the 1950s (Barrow, 1986). Since then, there has been a steady increase in the amount of research regarding PBL in K-12 and higher education. However the majority of empirical research still remains within the medical education field (Hung et al., 2008). Despite this, there have emerged several trends regarding the application of PBL within educational settings (Hmelo-Silver & Barrows, 2006). Researchers such as Barrows (1986) and Hung et al. (2008) state that there is no significant difference in the performance level of PBL learners compared to traditional learners. In addition, Schmidt (1983) states that there is also no significant difference between PBL and traditional learning in regards to the learners' short-term retention skills. However, both Schmidt (1983) and Hung et al. (2008) did observe that PBL learners consistently maintained a significant level of improvement over traditional learners in their long-term retention skills. Hmelo-Silver and Barrows (2006) add that when PBL learners were tested on their application and understanding of content, rather than the traditional recall of factual knowledge, they showed a significant level of improvement over traditional students.

In addition, PBL learners demonstrated significantly higher levels of effectiveness in the use and development of problem-solving (Othman & Ahamad Shah, 2013) and critical thinking skills (Kuruganti et al., 2012). This trend also repeats itself in areas such as motivation, self-efficacy (Hung et al., 2008), self-perception (Kilroy, 2004), and interpersonal and communication skills (Kuruganti et al., 2012), which are areas the subjects of this study will need to undertake. Overall the majority of the research showed little to no difference in the level

of classroom performance between PBL learners and traditional learners (Kilroy, 2004). However, the research did reveal that PBL learners displayed an increased level of motivation, engagement, confidence, and self-efficacy when compared to traditional learners (Kilroy, 2004). These trends are important to mention because they closely mimic the results of similar studies that have focused on the integration of constructionism and video games within the classroom (Kafai, 2006).

The Challenges of Integrating PBL in Classrooms

PBL is not without limitations, and there are several challenges facing instructors when attempting to integrate PBL into educational environments. One of the frequent problems cited in regard to PBL is that it places too much emphasis on higher order thinking and problem solving and too little emphasis on supporting lower levels of knowledge (Hung et al., 2008). In addition, both learners and instructors reported feeling that the material was not sufficiently covered (Hung et al., 2008); despite evidence that the content was more thoroughly understood and that the students' level of performance matched traditional learners (Hmelo-Silver & Barrows, 2006). In addition, Othman and Ahamad Shah (2013) add that because traditional instructionist methods place little emphasis on critical thinking, collaboration and problem solving, learners still rely on receiving information from their instructors rather than rely on self-efficacy, which can be a challenge when conducting a study of self-construction (Almeida, 2008). As a result, instructors are pressured to ensure that the learning process does not become too overwhelming for their students (Simons & Ertmer, 2005). Both constructionism and PBL are often overlooked because they require an extensive amount of time, planning and resources to facilitate within a classroom (Simons & Ertmer, 2005). It is because of these challenges that many educators have begun searching for alternative methods to introduce constructionism and PBL within the classroom.

One of the most popular methods has been the inclusion of educational-based video games (Squire, 2003), which is the activity that the subjects in this dissertation had to undertake.

Video Games

"Video games have quickly become one of the most pervasive, profitable, and influential forms of entertainment in the United States and across the globe" (Squire, 2003, pp. 2). Video games are more than just a form of entertainment. They represent a business model, one that has grown from a small entertainment market into a multi-billion dollar industry and a leading economic producer in the United States (Siwek, 2010).

It was not until 1985, when Nintendo released their home video game console, that video games made their move into the mainstream market (Sterin, 2012). Since that time, the video game industry has continued to develop at a breakneck pace, with the market continually flooded with new games, consoles and accessories (Gee, 2003). Since the new millennium, video games have maintained an active presence within the lives of children and adults as they continue to include video games as an active part of their lifestyle (Gee, 2007). One of the most common misconceptions facing the gaming field is that the majority of video game users are children, ranging from eighteen years old and younger (Gee, 2007). Despite these assumptions, the most recent demographical data shows that only 32% of video game players are under the age of eighteen (ESA, 2012). Thirty-one percent of all players are between the ages of 18 to 35, and 37% of all video game players are over the age of 36 (ESA, 2012). In addition, Telecki (2011) adds that the average adult game player has been playing for at least 12 years. With over 68% of the population over the age of 18, the average age of game players is now 30 years old (Terlecki et. al, 2011; ESA, 2012). However, despite the large percentage of adult video game players

there still remains a surprising lack of research focused specifically upon this demographic (Siwek, 2010).

According to the Entertainment Software Association (ESA), the average United States household now contains at least one device dedicated to gaming, such as a game console, handheld device or personal computer (ESA, 2012). In addition, 49% of those households now have an average of two devices dedicated to gaming. In 2011, U.S. consumers spent over $24 billion on video games and accessories, which has steadily risen from the $7 billion earned in 2005 (Siwek, 2010). Despite the U.S. economic recession of the mid-2000s, the gaming industry still retained an increased percentage of annual growth annually (Siwek, 2010).

Video Games in Education

Since their adoption, research into the application, design and effectiveness of video games within education has been a topic of increased interest (Gee, 2003). Gee (2007) largely attributes this influx of interest to the increased level of interactivity that video games provide over other forms of media. In addition, video games can more easily correspond to the individual interests of the learner, generating a great sense of engagement and interest in the classroom (Rosas et al., 2003).

For over two decades, the majority of video game research in education has focused on determining if video games offer any substantial benefits to learners (Squire, 2003). However, this trend has slowly transitioned towards determining the advantages of utilizing video games in the classroom (Moreno-Ger et al., 2008). This transition is due to the arguments of numerous researchers, such as Rosas (2003) and Kafai (2006), stating that video games offer academic value in the classroom. In addition, Gee (2007) and Squire (2005) have helped to further support these statements by arguing that video games can improve student motivation, attention,

retention, mood, and participation when introduced as instructional interventions. However, the term video game covers an expansive array of topics and genres. In order to gain a more thorough understanding of their application within education, it is essential to examine the differences that distinguish educational games from one another.

Classifying and Distinguishing Educational Games

Similar to academia, educational video games cover an expansive array of topics and utilize a large assortment of techniques, and methods (Charsky, 2010). In order to gain a proper understanding of the current application and use of educational games, it is important to clarify that not all educational games are equal nor should they be grouped under one generic heading (Egenfeldt-Nielsen, 2006). In fact, Egenfeldt-Nielsen (2006) clarifies that learning to play a video game or learning new material through a game does not automatically classify a game as an educational game. As a result, both Van Eck (2006) and Egenfeldt-Nielsen (2006) have grouped the application of educational games within the classroom into three different categories.

The first category is "educational games." These games are designed and marketed directly for use within various educational fields (Squire, 2003). The goal of these artifacts is to provide effective instruction on a particular topic using games as the medium (Egenfeldt-Nielsen, 2006). One such example is *Math Blasters*, which allows students to hone their basic mathematical skills through a series of challenges and mini-games (Gee, 2007). One of the major advantages of "educational games" is that they typically possess the full resources of a professional game development team and a strong focus on delivering accurate information (Van Eck, 2006).

"Educational games" are often divided into two groups; *edutainment* games and serious games. Edutainment games tend to focus upon providing instruction to leaners on a specific set of skills or knowledge, such as math, spelling or geography (Egenfeldt-Nielsen, 2006) and have frequently been praised for their effectiveness and their ability to be adapted to almost any level of education. Despite this, edutainment games have gained a reputation for being too narrowly focused on the entertainment portion of gameplay, rather than allowing both education and entertainment to be combined seamlessly (Gee, 2003). This becomes a problem because the developers are generating titles that are more focused upon providing entertainment to the students rather than focusing on retention and instruction (Charsky, 2010).

Serious games take a more active approach to finding a balance between the elements of gameplay and education, in the hopes of creating a title comparable to the high quality of their commercial game counter-parts (Van Eck, 2006). These games often receive the same praises as traditional edutainment games, but are additionally lauded as having more substantial content and focus on a particular subject. However, Papert (1998) warns that serious games often face the threat of becoming too unbalanced, with the focus relying too heavily upon creating an effective learning game resulting in gameplay that is no longer engaging. These are games that have fallen into the trap of "academizing," in which the creators are so focused on education that they fail to integrate the fun that makes video games appealing to begin with (Van Eck, 2006). As a result, many serious games tend to rely upon a drill and practice method of gameplay (Moreno-Ger et al., 2008; Overmars, 2004) which can be dull and repetitive for most players.

The second category is commercial games, which are games that are not specifically marketed towards learning, but instead are developed for entertainment and the mainstream market (Van Eck, 2006). Games such as *SimCity*, *Ages to Empire* and *Portal* are often found in

classrooms, but are all considered to be commercial entertainment games (Gee, 2007). Instructors frequently use these games, which are not primarily designed for learning, by adapting them for specific uses with their classroom (Van Eck, 2006). These games typically serve as a method of support, and are used when they coincide with similar topics discussed in class (Egenfeldt-Nielsen, 2006) or as a tool to motivate the learners (Overmars, 2004). Despite being used primarily as a tool for motivation, these games offer several advantages, such as the opportunity for students to gain new knowledge from incidental learning (Egenfeldt-Nielsen, 2006). One such example occurs when a student develops a greater interest in geography and world culture after playing *Where in the World is Carmen San Diego* (Charsky, 2010) or a greater interest in Greek and Egyptian mythology after playing *Ages of Mythology* (Gee, 2003). In addition, commercial entertainment games are generally more accepted by learners because the learners do not perceive them as educational games (Gee, 2007). Lastly, commercial entertainment games are more cost effective for educational systems (Van Eck, 2006) because schools can purchase a copy of the software rather than pay for the design and development of a specific educational game (Van Eck, 2006). However, because these games are designed for entertainment and not education (Gee, 2003) there is a large potential for misinformation and inaccurate data (Van Eck, 2006), which requires instructors to carefully examine the content and weigh the advantages and disadvantages of bringing a commercial entertainment game into the classroom (Van Eck, 2006).

The final category is when the learners design the games themselves (Moshirnia, 2007). Often using social constructionist methods, learners are instructed to design and develop a game whose purpose is to instruct others (Kafai & Resnick, 1996). Instructors assign students a wide variety of tasks such as content creation, character design, dialogue, programming, etc. (Rosas et

al., 2003; Squire, 2005). The former enables the students to learn the material through the application, development and the experience of designing their own game (Almeida, 2008). Allowing students to gain the opportunity to learn about the topic they are covering but to also "construct new relationships with knowledge in the process" (Kafai, 2006, pp. 3).

However, game design can be difficult to implement. It requires instructors to have a thorough understanding of a particular subject, the design process itself, programming, software and hardware. These factors, along with the cost and time of production, often discourage schools from integrating video games in the classroom (Van Eck, 2006).

Difficulties of Integrating Games Into Education

The integration of video games within educational environments has increased significantly over the last two decades (Kafai, 2006). However, despite the increase in use, video games still encounter obstacles when integrated into classrooms. Rosas (2003) attributed these difficulties to three major factors. The first is that instructors often still view video games solely as a form of entertainment, believing that video games lack value as an effective tool for instruction (Rosas, 2003). Second, instructors do not have the necessary design experience with video games and the hardware required to provide proper instruction. The third factor is that most academic settings lack the required hardware, software, or funds necessary for games to be implemented in the classroom (Rosas et al., 2003).

In addition, instructors have stated that video game-based methodologies tend to focus on an open ended and self-guided learning approach (Kafai, 2006), contrasting to existing educational systems, which are still based on the philosophy of control and measurement of learning. Halverson (2005) adds that it is difficult to see gaming meeting the demands of an increasingly standards-driven public schooling system. If video games are to be successfully

implemented in the classroom, they must overcome these challenges and provide educational systems justification for their adoption, which was one of the reasons for conducting this study.

Motivation and Engagement in Games

Along with engagement, motivation is an important tool for both education and video games. If a player is engaged by the content, story, gameplay, or characters, they are more likely to be motivated to progress further within the game (Lee et al., 2004). Likewise, if students are motivated, they will become further engaged and active within the classroom (Moreno-Ger et al., 2008; Gee, 2003) resulting in an increase in learning (Overmars, 2004; Dondlinger, 2007). When observing a group of students playing the commercial game *Ages of Mythology* in a classroom setting, Gee (2003) reported that learners spent additional time out of the classroom seeking out additional information about the topics they encountered during gameplay. Gee (2003) proposed that the game motivated the students to seek out more information based on their own interests and curiosity. However, Egenfeldt-Nielsen (2006) states that instructors often fall into the trap of using games as a rewards system, designed to motivate acceptable classroom behavior instead of enhancing learner performance or participation. This behavior often leads to the adoption of commercial entertainment games that have little to no relevance with classroom materials, because they are more readily accepted as a reward by the learners (Van Eck, 2006). Motivation is an important factor for this study because understanding why a learner plays a video game provides designers in both the educational and commercial markets, which is one of the goals of this dissertation.

Motivation and constructionism. The importance of engagement and motivation are closely tied to the theories of constructionism and social constructionism. Gee (2003) states that when players become more motivated, the greater their involvement in a game will be. Gee

(2007) also adds that the more customization the user is allowed, such as character appearance (Gee, 2007), plot points, level design, and map making (Holbert, Penny, & Wilensky, 2010), the more the player will become invested and will be motivated to keep playing the game (Roberson & Howells, 2008). This is similar to constructionist methodologies because the more a learner is personally involved, engaged, and motivated in the construction of an artifact, the greater their understanding and comprehension of the required content (Papert & Harel, 1991).

Additionally, Baytak and Land (2011) support the use of social constructionism as a method of utilizing game design inside the classroom stating that social interaction is an integral part of the design process (Baytak & Land, 2011; Kafai, 1996). Through social constructionism, game designers can create a system in which the users are encouraged and enabled to share content, designs and gameplay with one another (Holbert et al., 2010; Roberston & Howells, 2008) resulting in greater motivation and a stronger product.

Gatekeeping through game design. Game design has been frequently used as a teaser to topics such as technology, mathematics, and science, especially for female learners (Baytak & Land, 2011; Kafai, 1996) to help generate new interest in topics that had been previously dismissed by learners (Kafai, 2006). Baytak and Land (2011) explored game design as a means to observe a group of fifth grade students that constructed their own educational game, even though the students had little to no prior experience in game design. All of the students managed to complete their individual game designs by the tenth design session, with both male and female students showing an increased interest in concepts such as programming, computer science, and game design. This finding confirms what Kafai (1996) investigated a decade previously when she conducted a similar study with students with no prior experience in game design. By the end of the experience, students were actively engaging in programing, graphic design, interface

design, storyboarding and instructional design (Kafai & Resnick, 1996; Kafai, 2006). The learners also showed an increased interest in applying the concepts of game design in other subjects and topic areas (Kafai, 2006).

Women and Video Games

The total percentage of female game players has rapidly increased in the last ten years (Kafai, 2008). Previously considered to be an exclusively male dominated activity, recent studies now show that females make up over 47% of the general gaming population (ESA, 2012) and over 55% of the casual, mobile, and social gaming population (Brar, 2012). In addition, females 18 years or older now represent a significantly higher population at 30% compared to the 18% of male game players 17 years and younger (ESA, 2012; Terlecki et al., 2011). Despite the proliferation of females gamers, there exists a surprising disconnect between females gamers and the perceptions placed upon them by society (Kafai, 2007). It shouldn't be a surprise that female players and designers have rarely been included in the design of games. It was because of the former that this study was conducted.

Common Misconceptions and Theories

Despite evidence to the contrary, the popular assumption among the general populace is that female game players are vastly outnumbered by their male counterparts (Carr, 2005; Kafai, 2008). This perspective is not only shared by both society and media, but also throughout much of academia (Crawford, 2005). Throughout the literature, there are reoccurring theories on why females are repeatedly marginalized in regards to video games (Lucas & Sherry, 2004). One such theory is that women are frequently presented with fewer opportunities, compared to males, due to factors such as social pressure or a lack of access to game consoles. However, the majority of females surveyed by Besisser (2006) disagreed, reporting that they did not feel that social

pressures or a lack of access was a significant contributing factor to the misrepresentation of women.

The disconnect between females and game design has also been observed within the games industry, with fewer than 20% of all employees being female (Thornham, 2008), and less than 3% of those employees being directly involved in the programming or design of game content (Thornham, 2008). According to Brar (2012), females within the industry are often met with a high level of hostility and discrimination despite the increased presence of female designers within the market. In fact, many are still finding it difficult to enter the industry themselves (Brar, 2012), which was what this study was hoping to address as it examined the experiences of female game designers.

In addition, the majority of marketing for video games remains solely focused upon male players (Kafai, 2008; Carr, 2005) with the industry creating advertisements and marketing tools designed to target traits that are typically associated with male audiences (Denner, Bean, & Werner, 2005; Thornham, 2008). As a result, these games are often marketed upon themes such as violence, action, competition, and gender stereotypes. They focus less on themes such as meaningful content or social interaction (Hartmann & Klimmt, 2006). As a result, female characters within games are frequently cited as being portrayed as unrealistic and prone to using oversexualization, often using gender stereotypes as defining characteristics (Hayes, 2005). Yao, Mahood, and Lidz (2010) state that these female characters are more often used as marketing tools, designed to encourage sales to male audiences, rather than to enhance the content of the game.

Another problem, cited by Barganza (2011), is that the industry frequently misrepresents the demographics of female gamers, often generalizing all female players into one all-

encompassing group, with no other distinguishing factors such as age or gameplay preference. This is in direct contrast to male demographics, which are often divided into multiple categories based on factors such as age range, online and offline gameplay habits, and genre preferences (Royse et al., 2007). As a result, many companies generalize their marketing to the creation of "girl games." These are games that stereotypically all female players should theoretically like. Examples of such games include those with a focus on fashion design and dating.

Past Research on Females and Games

Regardless of these misconceptions, females have not been completely excluded from video game based research (Carr, 2005), which has revealed that many of the previously conceived notions about female players are inaccurate (Hayers, 2005). Hartmann and Kilmmt (2006) explored the previous assumption that factors such as violence, competition, or the misrepresentation of female characters would deter female gamers from participating in certain genres or titles. Instead, female players reported that factors such as social interaction and gameplay were of greater significance when determining gameplay participation. In addition, the players stated that factors such as violence or the representation of female characters had little influence over their gameplay decisions.

Besisser (2006) and Kafai (1994) explored the differences between genders and the levels of self-efficacy in regards to learner performance. Both Besisser (2006) and Kafai (1994) compared the performance of male and female learners during the design, development, and use of video games. They observed that while the research reinforced the previous assumptions that male and female learners have different sets of behaviors in regards to gameplay, there was no significant difference in their performance while designing or developing a game (Besisser, 2006; Kafai, 1994).

Lastly, the integration of video games into educational environments has been cited as a gatekeeping tool (Flanagan, 2005), allowing instructors to introduce topics such as computer science, math and programming to learners (Lucas & Sherry, 2004). This early interaction could be used to foster interest for both male and female students in more advanced and technologically focused fields (Dickey, 2006).

A preference towards preferences. Despite increased efforts to include females within video games research (Carr, 2005), much of the research has remained limited to examining the preferences of female players (Flanagan, 2005). The goals of these studies were frequently focused on determining if women have higher preferences towards certain types of games compared to male players (Hartmann & Klimmt, 2006) and, if so, how future games could be designed to accommodate these preferences (Carr, 2005). My study addressed this by further examining how personalized player preferences and motivations are integrated through the design of constructionist artifacts.

However, Hayes (2005) and Brar (2012) argue that the majority of preference-based studies are flawed, with researchers failing to account for other variables that may determine a player's preferences. This has been frequently observed in cases with female gamers, with researchers only classifying female players by their gender. In doing so, researchers are limiting the future saturation of potential game types and continue to reinforce gender stereotypes (Terlecki et al., 2011).

Dickey (2006) states that researchers often work from the assumption that preferences and game play choices are static and seldom undergo change easily. Instead, he argues that player preferences are complex and are formed using the female player's personal experiences, knowledge, and current situation (Dickey, 2006). It is because of this that it is difficult to

generalize the preferences of all females into just one group (Carr, 2005). Flanagan (2005) believes researchers often utilize this methodology because it allows the participants' responses to be more easily observed and quantified. This is in direct contrast to the research conducted within this dissertation, which explored the individual factors that determine female learners' decisions as they developed their own game interface.

Synopsis of the Literature Review

While there has been an extensive examination on the concepts of constructionism and its applications within education, the overall amount of literature and research focused upon game design and constructionism is sparse (Baytak & Land, 2011). One potential contributing factor could be the lack of empirical research in regards to the process of integrating video games into the classroom (Hong et al., 2010; Kafai, 2006).

Baytak and Land (2011), and Kafai (2006) state that there are two major trends within the research of educational applications of video games. The first focuses on the effects of using video games in the classroom, such as whether students perform better with the integration of games or with traditional instructionist methods. The second focuses on using game design as method of introducing constructionist methodologies into the classroom. Kafai describes this as, "making games for learning instead of playing games for learning." Of the two trends, there has been a significantly higher amount of qualitative and quantitative research into effects of video games in education rather than the application of games design as a constructionist method (Kafai, 2006).

While researchers such as Peppler and Kafai (2007), Baytak and Land (2011), and Weintrop et al. (2012) have observed a significant increase in learner engagement, personal meaning, motivation, and performance from integrating game design within the classroom, there

still remains a significant lack of empirical research data (Reiber, 2004), where much of the previous research has focused on learners in a K-12 population (Hong, Fadjo, Chang, Geist, & Black, 2010). As a result, research exploring the effects of constructivism, social constructionism and game design within higher education is almost non-existent.

Lastly, the majority of research focused on games and constructionism has revealed a significant level of variance between both male and female learners. However, the majority of studies that have focused on a female population have been limited to determining player preferences (Hayes, 2005; Carr, 2005), gameplay frequency (Lucas & Sherry, 2004), academic application (Besisser, 2006), and gender comparisons (Royse et al., 2007; Brar, 2012). At this time, no study has explored the development of a 2D game interface among female undergraduate college students using constructionism as the lens for development. This is precisely why this dissertation research was conducted.

In Chapter Three, this document will explore the methodologies used to conduct this study and the rationale behind their inclusion. The section will also take a closer examination at the population, unit of analysis and the site used to conduct this study.

CHAPTER 3

RESEARCH DESIGN

This dissertation was a phenomenological study involving female undergraduate students majoring in Communications Media at Indiana University of Pennsylvania designing a 2D game interface. This research built upon Almeida's (2008) exploration into the experiences of K-12 learners as they designed and produced their own video games in an educational setting. This study served to advance the literature of constructionism and educational game design by providing exploratory data regarding alternative methods of integrating constructionism in educational settings through the application of game design.

Given the exploratory nature of the study, participants were engaged in the design of their own 2D game interfaces using a familiar environment. Participant experiences were gathered *in vivo*, to avoid the creation of *a priori* assumptions. In addition, the lived experiences of female game designers were explored and described through the lens of constructionism (Van Manen, 1998).

This chapter provides a detailed description of the components of this study's research design. First, is an account of the qualitative research paradigm and why such an approach is appropriate? Next the unit of analysis and the rationale for choosing the site is described. This is followed by a review of the process for data collection and analysis. Last, issues of quality, ethical considerations, and my own background are discussed.

The Qualitative Research Paradigm

The qualitative research paradigm stands as an example of the integration of inductive reasoning with constructivist, constructionist, and post-positivist methods into a single research methodology (Almeida, 2008; Creswell 1998). Through qualitative methods, researchers may

avoid the creation of *a priori* assumptions, instead focusing on exploring the experiences and shared meanings that are derived from the participants themselves, making it appropriate for this dissertation.

Differing from studies of quantity, qualitative research studies advance the use of inductive reasoning (Almeida, 2008), which relies upon observations, the collection of artifacts, and the exploration of shared meanings and themes as they are presented by the subjects (Creswell, 2009). This data is then compiled and examined for potential themes or patterns which could lead to possible relationships among variables (Baran & Davis, 2011). Creswell (2009) describes this process as gathering small units of meaning to compare for possible larger overarching themes. As a result, this study was conducted utilizing qualitative research and inductive reasoning in order to gather the experiences of female undergraduate students as they construct their own 2D game interface through the lens of constructionism.

Why a Qualitative Design Is Appropriate

Qualitative research integrates natural processes into the research design, and in order for the research to progress, natural settings rather than controlled environments must serve as the backdrop for data collection (Patton, 1990). Through the use of natural settings, the investigator is able to further explore the lived and shared experiences of the participants as they utilize constructionist methods (Van Manen, 2003) without potentially altering the results. This is accomplished by exploring the meanings, events, and experiences of the participants through the observation of natural processes and the exclusion of *a priori* assumptions (Lincoln & Denzin, 2006).

The goal of this study was not to generalize the cause, frequency, or associations between females and game design (Baptiste, 2005). Rather, it was to describe the experiences within a

natural setting by gathering the thick descriptions (Lincoln & Denzin, 2006; Creswell, 2009) of female undergraduate students in communications media as they design and develop a 2D game interface. Thick descriptions are detailed accounts of the experiences of participants and how the researcher is able to identify patterns from these accounts and put them into a proper context for their audience to be able to understand (Creswell & Miller, 2000). It was because of the former that a qualitative method and a phenomenological approach were deemed appropriate.

Rationale for Conducting a Phenomenological Study

Phenomenology has been defined as both a philosophy and a methodology (Creswell, 2009) whose purpose is to provide further understanding of how individuals conceptualize their own viewpoints or past experiences (Ferencz-Flatz, 2011; Almeida, 2012). Husserl adds that phenomenology is a method to further explore a specific phenomenon, through the perspectives of the participants that experience it (Dowling & Cooney, 2012), essentially using the lived experiences of the participants to gain insight into the possible meanings these experiences represent (Mapp, 2008). Creswell (2007) explains that this is accomplished by reducing the participants' experience into a composite description, known as the essence, which allows researchers to convey what the participants have experienced and how they perceive that experience (Moustakas, 1994).

Husserl (1970) states that through phenomenology, researchers can seek to understand a specific populations' perceptions of reality by exploring the motivations of their actions, such as why video game users tend to design video games around a specific genre. However, for researchers to accurately record the lived experiences of a population, they must first "suspend their own personal beliefs about the research phenomenon" by utilizing a process known as phenomenological "reduction" or "bracketing" (Mapp, 2008). Bracketing requires a researcher to

document and then set aside prior knowledge regarding the phenomenon in order to reduce any potential bias (Flood, 2010). This will allow the researcher to more accurately describe the participants' experiences without relying on their own personal knowledge and experience to more accurately interpret the participants' responses (Mapp, 2008; Creswell, Hanson, Plano, & Morales, 2007).

It was the goal of this dissertation to explore the experiences of female undergraduate, communications media students as they construct their own 2D game interface. By utilizing transcendental phenomenology (Moustakas, 2007), I described the experiences of the participants as they constructed their artifacts. Through the use of phenomenological reduction, I focused upon the descriptions of the participants without interpreting their responses based solely upon my own experiences (Mapp, 2008). It is my hope that through this research I provided an accurate description of what the subjects experienced through the perspective of their own life worlds.

Unit of Analysis

The unit of analysis for this study was the individual participants (female, undergraduate, communications media students). According to Moustakas and Creswell (2007) transcendental phenomenology is well suited to focus upon the experiences of the subjects while simultaneously removing the researcher's personal perspective as much as possible. By utilizing this approach, it allowed the research to remain focused upon the individual subjects and provide a more detailed description of their individual experiences (Creswell, 2009; Creswell, Hanson, Plano, & Moarles, 2007).

Researcher Relationship and Power

Within qualitative research, there exists the potential for bias or outside influences that may affect the participants' responses (Gallagher & Francesconi, 2012). As a result, researchers must reduce any potential bias or influence these biases may generate by clearly establishing the relationship between the participants and the researcher (Almeida, 2012). In order to establish a casual tone and procedure for this research, the participants were encouraged to respond to the questions as informally as possible. Every effort was be made to gather observational data in such way that the process was unobtrusive and did not impact design decisions. Lastly, all participants were reminded that there were no expected outcomes for this research, and that there were no "right or wrong answers" to any questions posed to them. Instead, it was the goal of this research to explore the honest and unfiltered descriptions of each participant's experiences while producing a game.

As a faculty member within the Communications Media Department, I realized that I held a position of power and influence over the participants. From 2009 to 2014, I have taught a number of classes, mostly targeted to freshmen and sophomore level students. As a result, there was the possibility that the participants could have discussed me with other students. By stating that an element of power exists, the participants' perceptions of me as an authoritative figure could be reduced providing a more relaxed environment.

In addition, my role as a doctoral candidate within the Communications Media Department could lead to altered participant perceptions. The participants could potentially have viewed me as privileged, as a result of the differences between our undergraduate and graduate student statuses. There was also the possibility that the participants could have viewed me as a peer and fellow student, rather than just a faculty member, possibly creating a greater sense of

trust and allowing for a more natural environment. This could have been further encouraged by the relatively small difference between the age range of the participants (18-25 years) and me. Furthermore, there remained the potential that these differences could lead the students to become too informal or question my role as the lead investigator of this study. My goal was to maintain a professional attitude with the participants, thereby creating a respectful, safe and open context in which to conduct this study.

Lastly, with all of this study's participants having been female undergraduate students within the Communications Media Department, the issue of gender difference must be addressed. As the principal investigator, and the only male present throughout the study, there could have been perceived differences in the relationship between myself and the participants, particularly in regards to issues of trust and gender perceptions. In order to reduce any potential misconceptions, the participants were frequently reminded that there were no expected outcomes, responses or designs for this study.

The Site

Indiana University of Pennsylvania (IUP) is a public university located in Indiana County in northwestern Pennsylvania and serves as one of the largest universities in the state as well as the largest university within the Pennsylvania State System of Higher Education (PASSHE, 2012). IUP has a consistent record of providing excellence in education as well as being repeatedly featured among Princeton Review's "Best Colleges" and Forbes Magazine's "America's Best Colleges." Additionally, the university has been referred to by the Pennsylvania Department of Education (2011) as a state of the art campus, featuring a university wide wireless system, online teaching courses as well as hosting numerous lab facilities and associated equipment. The current university population is approximately 15,000 students with 12,827

undergraduate students, 56% of which are female and 44% male (Peterson's Nelnet Company, 2011), and a graduate student population of 2,229 (Pennsylvania Department of Education, 2011). The university is comprised primarily of white Caucasians. The campus is 81% White, 11% Black, 4% Race/Ethnicity unknown, 2% Hispanic/Latino, 0.6% two or more races non-Hispanic/Latino, 0.2% American Indiana or Alaska Native (Pennsylvania Department of Education, 2011). IUP features 621 international students from over 70 countries.

The Department of Communications Media is currently among the three most popular programs within the university (PASSHE, 2012) and offers programs at both the undergraduate and graduate level, including a doctoral degree. The department features "state-of-the-art facilities and equipment" including the Applied Media and Simulation Games Laboratory, an audio recording studio, a photography studio, a non-commercial radio station, a local cable television station, the Advanced Graphics and Multimedia Lab, and the Digital Media Institute. At the time of this study there were over 555 students enrolled at the undergraduate level, and over 65 enrolled at the doctoral level. In addition, there were 261 female and 294 male undergraduate students registered within the department.

Rationale for Choosing the Site

The primary reason for conducting this study at Indiana University of Pennsylvania was convenience. IUP is the largest school in the Pennsylvania State System of Higher Education and contains a female undergraduate population percentage of over 56% (Peterson's Nelnet Company, 2011). Because the purpose of this study was to explore the lived experiences of female undergraduate students designing their own 2D game interface, selecting a site with a significant percentage of female students was critical. This decision was further strengthened by the significant female population of the Communications Media Department with 47% of the

undergraduate population being comprised of female students. Additionally, this site was selected due to my prior relationship with the department and the accessibility to both a viable population and facility to conduct this research study. The location was convenient for both the population and me, providing an acceptable distance for the learners to travel and meet.

Data Collection and Observations

The lived experiences of female undergraduate Communications Media students designing their own 2D game interfaces were captured by recording the narratives and observations that highlighted their experiences (Almeida, 2008; Van Manen, 1998). Due to the exploratory nature of qualitative research, I did not impose any *a priori* assumptions on the results of the data collection. The participants' behaviors were observed in bi-weekly lab sessions, audio-recorded focus groups, and through the collection of game design artifacts such as their game interfaces. Prior to the start of the research, the range of potential participants was set at six to twelve (Polkinghorne, 1989; Creswell, Hanson, Plano, & Morales, 2007; Almeida, 2012), seven students volunteered for the study, however, only six students comprised the final selection of participants for this study. The seventh volunteer was unable to attend due to scheduling conflicts.

For the purposes of this study, I followed the observational method recommendations of Bogdan and Biklen (1992). This approach focuses on the capture of observational data including non-verbal and verbal behaviors, interactions between subjects, and the physical setting for the research (Almeida, 2008). An observation protocol developed by Almeida (2008) was to be used in this research study to observe participants biweekly for a period of six weeks, three times a week for 60 minutes each session as recommended by Seidman (1998). However, due to scheduling challenges the participants met twice a week for 90 minute sessions. This still

provided an outsider viewpoint (Trochim, 2006), otherwise known as a "detached" perspective (Flood, 2010). This observation method helped to prevent my viewpoints from influencing the participant's reports in the investigation (Trochim, 2006). From a "detached" perspective, the focus was to remain on the collection of nonverbal and verbal communications expressed throughout the participants' experiences. In addition, the observational data provided me with additional sources of data that were used to complement and advance triangulation of data collection (Lincoln & Denzin, 2006).

The observational sessions were conducted in the Applied Media and Game Simulations Lab (AMGSL). At the beginning of each session, the participants were assigned a computer station that was used for the duration of the study. Each station was identical in both hardware and software to reduce any chance of bias or preferential treatment to particular participants.

The observations were conducted in a biweekly pattern, during the second, fourth, and sixth weeks of the study. I observed the participants during each of the two weekly sessions for approximately 90 minutes. In order to ensure that a direct observational approach was followed, I withheld all questions or comments on noted non-verbal or verbal behaviors until the focus group sessions. During the observations, I sat at an identical participant computer station in order to minimize presence and to reduce any influence that I might have had upon the participants by virtue of physical position (Schatzman & Strauss, 1973; Almeida, 2008). I was aware that my presence could have introduced some discomfort among the participants and strived to maintain a passive presence while conducting the observations in order to reduce any potential influence on the participants' performances.

To further reduce tension, all observational data was collected through note taking. According to Almeida's (2008) observation protocol (Appendix), each week the observations

focused upon different aspects of the participants' process. The first week's session focused on the environment, which included the setting itself, the interactions between the environment and the participants, and any possible impact that it might have upon their progress. During the second and third observational weeks, the sessions focused on participants' non-verbal and verbal behavior, social interaction, interaction with the technology, and the integration of constructionist methods.

Interviewing Procedure

In order to triangulate data (Lincoln & Denzin, 2006), I could not rely solely upon observational data or artifact collection to explore the essence of an experience (Gallagher & Francesconi, 2012). I needed to conduct three open-ended focus group sessions (Creswell, 1998; Almeida, 2008), allowing me to collect the participant's narratives, reflections, interactions, stories, comments, and discussions regarding their experiences while creating a 2D game interface (Kitzinger, 1995). It was the goal of this study to collect these lived experiences (Van Manen, 2003) and describe any possible viewpoints or realms of knowledge that the participants may have had.

I followed Kitzinger's (1995) and Powell and Single's (1996) focus group recommendations and conducted three semi-structured focus group sessions, with all participants present during each session. The purpose of conducting three sessions was to allow me to gather the relevant data pertaining to the participants' experiences, while reducing the chance of replicating pre-existing data from previous sessions (Powell & Single, 1996). Each session lasted 60 minutes and was conducted in person.

The AMSGL site was chosen for convenience, accessibility, and familiarity to the participants. The site is a small computer lab featuring 14 dual monitor computer stations,

comfortable chairs, an instructor station, and chalkboard. There were no foreseeable distractions aside from the regular daily building and classroom protocols.

Participants were interviewed together as one group and were encouraged to keep the tone causal and non-judgmental (Powell & Single, 1996). The participants were reminded that there were no "right or wrong" answers to the questions asked. I used prompting techniques and open-ended questions to gather clarification, and to explore the participants' answers in greater detail (Powell & Single, 1996).

The first round of interviews was conducted in February, with the second and third rounds taking place in April. The participants were not required to sign any consent forms for the interviews, due to previously signing them on an earlier occasion. In order to reduce any potential distractions, participants were asked to silence all mobile devices for the duration of the interview session. Throughout each session two stationary microphones were used to record the proceedings with the participants being reminded that all recordings were being used for transcription purposes only. At the completion of each session, the participants were thanked for their time and dismissed. Immediately following each session, all transcriptions and recordings were backed up onto a portable flash drive and were locked in a cabinet in my office. Only my dissertation chair and I had have access to these materials.

Document Analysis

Within a phenomenological research design, investigators are not capable of relying upon formulas or software to conduct an analysis; instead, they must rely on their own investigation and understanding of the content (Almeida, 2012). As a result, an investigator seeks to derive further meaning and credibility by gathering documents and artifacts that directly relate to the experiences of the participants (May, 2011).

In order to address this need, participants were encouraged to save any and all design and design-related documents that they produced during the course of the research. At the conclusion of the research sessions, all notes, designs, concept art, and a copy of their final 2D game interface were collected. These documents were recorded and saved, with the originals being returned to the participants at the conclusion of the study. In order to ensure that the artifact collection did not interfere with the construction of the participants' artifacts, they were not collected until the conclusion of the study, allowing the participants as much time as possible to complete their artifacts.

Contacting the Site and Selecting the Pupils

I contacted Indiana University of Pennsylvania (IUP) six months prior to the expected start date for the research study to ensure the availability of the site and population. To ensure there were no conflicts of interest, I met with the department chair of the Communications Media Department and the director of the Applied Media and Simulations Game Lab.

The participant selection process was conducted over a two-week period. I encountered little difficulty in gaining permission to access classrooms from faculty members due to my relationship with the department. I contacted each faculty member in person and provided an explanation of the purposes of my research. Afterwards, I asked their permission to attend their class sessions to inquire if any female students were interested in participating in my research study.

Over a two week period, I visited a variety of Communications Media courses in the hopes of covering as wide a degree of subject variability as possible. During each classroom visit, I distributed a copy of the informed consent form and the participant registration form to all female students in each class. Once the forms had been distributed, I explained the purpose of the

study was explore their experiences as female game designers and answered any questions that the students had. At the conclusion of each class, the faculty member collected and returned any completed registration forms, adding potential subjects to the subject pool. I did not conduct any observations or interviews prior to receiving the participant's signed informed consent form.

Purposeful sampling was utilized (Creswell, 1998). The purpose of this sampling technique was to focus upon information-rich cases, in this case female undergraduate students enrolled within the Communications Media program. I chose to use Patton's homogeneous sampling to reduce the variations among the sample, to simplify the analysis process, and to further facilitate group interview sessions (Trochim & Donnelly, 2005; Patton, 2001).

Any female student between the ages of 18 and 25, and currently enrolled within the undergraduate program of the Communications Media Department at IUP was eligible to participate in this study. Aside from the previously mentioned inclusion criteria, there were no pre-requisites, such as prior gaming or design experience, academic standing or area of focus within the department. Due the criteria used during the sampling process, the potential for the participants to know each other was quite high. In fact, each of the six participants had at least prior experience with at least one other participant within the study. Male students enrolled within the Department were not eligible to participate because the purpose of the research is to focus upon a female population. In order to generate greater variability in the experiences and background of the population, I focused on generating a sample from a variety of Communications Media courses.

Due to the self-guided nature and requirements of the study, the participants worked each session with no facilitator or instructor. Participants had to effectively manage their own time and utilize self-efficacy as they designed and developed their artifacts. My interaction with the

participants was limited to providing access to the lab facilities at the start and conclusion of each session. During this time, I was presented with the opportunity to talk with the participants about their designs, progress and experiences. It was my hope that such experiences helped to develop a rapport and understanding between the participants and me.

Data Analysis

The analysis of phenomenological data is derived by condensing the accounts, descriptions, and lived experiences of the participants into a composite description, known as the essence (Moustakas, 1994). In order to compose the essence of an experience, a researcher must compile the phenomenological data through several phases (Creswell et al., 2007; Almeida, 2012). For this study, I followed Patton's (2002) and Creswell's (2007) process, which was composed of four phases.

The first phase is known as the epoche phase. During this phase, the role of investigators is to reflect on the nature of their assumptions and potential biases that they may bring into the investigation (Moustakas, 1994; Creswell et al., 2007). As with both phenomenology and qualitative research, it is important that any issues of bias or the creation of *a priori* assumptions were addressed to further increase the study's credibility.

The second phase requires the researcher to separate out bias and any data that is no longer relevant to the study in a process known as phenomenological reduction or bracketing. Its purpose is to maintain focus on the collection of essential information and to avoid integrating bias or creating assumptions within the study (Creswell, 1998). During this phase, I explored the statements of the participants and recorded any references to the phenomenon of constructionism and game design.

During the third phase, the researcher will gather the statements, observations, and experiences and will begin to organize them in a process called "horizonalization" (Creswell, 1998). Throughout this phase, I analyzed the data and begin organizing it into "clusters of meaning" that allowed me to draw connections from the data (Creswell, Hanson, Plano, & Morales, 2007).

The fourth phase is known as the synthesis step, which combines the experiences of the participants throughout the study with their descriptions of how they experienced the phenomenon of constructionism and game design (Creswell, 1998; Almeida, 2008). This newly synthesized data will be used to provide the essence of the experience, which will provide a unified description of the event and experiences of the subjects that can be used to bring further understanding to the readers (Denzin, 1989; Creswell, 1998). To ensure the credibility of the findings, I was physically present and attentive during both the data collection and data analysis phases. In addition, I collected focus group interviews, observational data and artifacts (participants' 2D game interfaces) and maintained the same protocols of data analysis throughout the study. At the conclusion of the data collection period, I used Microsoft Word, Excel and NVivo10 to code the data and generate themes using Granehiem and Lundman's (2003) recommendations.

I originally planned to transcribe the data myself, but in order to make more effective use of my time, a transcription service was hired. Afterwards, I carefully reviewed each transcript while listening to the audio recordings twice to help ensure their accuracy (Granehiem & Lundman, 2003). I took this action to ensure that the data remained as consistent as possible and to increase my familiarity with it. Each focus group session was recorded using two microphones and Q-base audio recording software. Later, there were transcribed manually to Microsoft Word

and Windows Media Player. I reviewed the transcripts of each recording prior to starting the data analysis procedure in order to capture any pauses or changes in inflexion or tone (Almeida, 2008). Throughout the study, I kept a series of notes and reflections based on my observations, artifact collection, and interviews. I used these to help compile the data analysis. After reviewing the completed transcripts twice, I began generating meaning units (Granehiem & Lundman, 2003), which I organized using Microsoft Word, Excel and NVivo.

After I generated the meaning units, I used the process of condensation and abstraction to reduce the statements to their core ideas, also known as "codes" (Granehiem & Lundman, 2003; Creswell et al., 2007). This information was organized using an Excel document table that allowed me to better visualize and organize the data. After I created the codes, I sorted them into categories. These categories were mutually exclusive. To ensure that no codes overlap two categories, I divided the categories into sub-categories first (Granehiem & Lundamn's, 2003). These sub-categories allowed the data to be further sorted and provided easier abstraction into categories. From these categories, I developed themes based on my interpretation of reoccurrences within the data.

Enhancing the Study's Quality

Both qualitative and phenomenological research rely on the perspective of the investigator to interpret the data and participants' experiences (Van Manen, 2003) ensuring that issues of trustworthiness and quality are addressed. To improve the quality of this study, I selected a variety of methods that were best suited to the purpose of this study and the resources available (Almeida, 2008). These methods were methodological triangulation, reflection on and critique of researcher biases, member checking, and the use of thick descriptions.

Methodological triangulation uses multiple methodologies to measure and explore the same phenomenon (Buddenbaum & Novak, 2001; Denzin, 1970). The use of triangulation allowed me to investigate overlapping variances and to provide further validity to the portrayal of the phenomenon. In addition, multiple methods were used to "uncover some unique variance which otherwise may have been neglected by single methods" (Jick, 1979). I included observations of the participants, focus group sessions, and the collection of artifacts, e.g., the final game interfaces and design documents.

To further ensure the quality of the research, I stated my bias by informing the readers that I had my own set of biases regarding constructionism and the representation of women in game design (Creswell, 2009; Merriam, 1998). However, my bias does not imply that I would intentionally ignore any findings or interpretations that conflict with my own beliefs or expectations. In order to maintain this standard, I strived to keep an open mind and a willingness to accept any data that could conflict with my own expectations (Lincoln & Denzin, 2006). I worked to the best of my abilities to ensure the integrity of this research study, despite any bias that I may consciously hold.

Member checking allows the researcher to utilize the participants as a further check for validity (Creswell & Miller, 2000). I asked the participants to confirm whether they believed the results to be an accurate reflection or interpretation of their work and statements (Lincoln & Guba, 1985). I accomplished this by conducting a brief review a week after each of the three focus group sessions.

I integrated thick descriptions as an additional method of ensuring the overall quality of the research. A thick description is a detailed account of the experiences of the participant and the processes used by the researcher to identify patterns from these accounts and put them in the

proper context (Creswell & Miller, 2000). I used thick descriptions to provide a more detailed account of the settings, the participants, and the themes present in the research (Creswell & Miller, 2000). Doing so allowed me the opportunity to expand upon the experiences of the readers, creating a greater sense of interaction through a narrative approach, and allowed me to further draw them into the phenomenon and setting (Denzin, 1989).

Ethics

Prior to participant selection, I reviewed the objectives, procedures, and goals of the research study to ensure a thorough understanding of the requirements and expectations placed upon participants (Creswell, 2009). I included (a) the intended goal for the research, (b) the anticipated duration of the study and its sessions, (c) an overview of the rules and procedures, and (d) their rights and privileges as participants.

In addition, I informed each participant (a) that participation was strictly voluntary and would have no impact on their grades or academic standing with the department or university, (b) that the participants were free to leave the study at any time, and (c) that all data involving their participation would be removed and, thereby, made ineligible for use within the study. Compensation was offered for participation in the form of a Kindle Fire or gift card presented at the conclusion of the study for all who completed it. Non-participants and any participants who withdrew from the study were informed that they were no longer eligible to receive any compensation.

To ensure the confidentiality of the participants' identities, each were assigned a randomly generated pseudonym (Buddenbaum & Novak, 2001). All access to participant information and data was restricted to me and my advisor. I informed the participants that I

would be submitting professional articles based upon the data collected and would be attending professional conferences at which I may present such data (Creswell 2009).

Researcher Identity

Qualitative research is often viewed as an inductive method of exploration, in which an investigator explores a specific phenomenon and strives to interpret the experiences of those involved through their own understanding and framework (Almeida, 2012). In order to further strengthen the validity and trustworthiness of this study, it is important to provide further insight into my background and personal experiences that helped to give shape to this research.

I am a middle class, Caucasian male, citizen of the United States. I am still relatively young in the academic environment. However, I have spent the last ten years immersed in higher education. My upbringing comes from a highly religious, honest, and open-minded family, with deeply rooted Christian beliefs and morals. I am a friendly, caring, talkative, and rather approachable individual. My personal philosophy is deeply grounded in the idea that I should always strive to help others to the best of my ability, always keeping an open mind to other cultures, viewpoints, and lifestyles. I believe that people are entitled to their opinions and viewpoints, and that I should always leap at the opportunity to learn from others.

Over the past four years, I have served both as a doctoral candidate and a temporary faculty member at Indiana University of Pennsylvania. These experiences have allowed me to understand the educational process in detail. It has also served as a driving force to continually seek out methods to improve my own instruction and the instruction of others. My educational approach is heavily based on instructional design, constructionism and rapid prototyping. I prefer to involve my students in the learning process as much as possible, and place a high level of importance on interactivity and production.

I would say that I am a pragmatist who also encourages the exploration of the new thoughts and ideas that a relativist perspective can foster, within reason. I am open to interpretation and alternative means of exploration and learning. I find it essential that learners be given the opportunity to move beyond facts and numbers, and be able to integrate their own experiences, knowledge, and points of view into the instruction.

The following chapter will provide a detailed account of the experiences of the individual participants and their interactions as they designed and developed their own 2D game interfaces. It will also explore the findings of this study and how it led to the development of five overarching themes.

CHAPTER 4

RESULTS AND DISCUSSION

Introduction

In this chapter, I provide descriptions of female undergraduate students as they designed and produce their 2D game interfaces. This study's findings explore and discuss the themes that emerged from the data collected.

Background of the Participants

There were six participants in this research study. All six participants were female Communications Media undergraduate majors at Indiana University of Pennsylvania. Four of the participants were beginning their junior year of college, while the remaining two were graduating seniors. They all had prior experience playing video games. However, only one participant had prior experience designing or developing a video game. The descriptions that follow are my perceived representations about them based on this study's observations and from speaking with them during interview sessions. Each of the participants was given a pseudonym in order to protect their anonymity.

Moira

Moira was a gifted artist, a multi-tasker, and given to perfection in her work. She was always the first to arrive each morning and would begin working almost immediately. It was quite apparent from the beginning that Moira took her work very seriously, bringing her own equipment and art supplies, a Wacom digital drawing tablet, and her personal laptop. From what I observed, she spent very little time interacting with her fellow participants throughout the study. Typically, at the start of each session, she would listen to music through her headphones while she worked, which she described as being important part of her design process.

Moira described herself as a binge gamer, someone that could spend hours upon hours playing a game and then have to force herself to quit until she became caught up with her schoolwork. Additionally, she was the only participant with any prior game design experience, having taken a 2D game design course and practicum whose primary tasks involved working on game design and development. She was quite familiar with a variety of programs which included Photoshop, Illustrator, and UDK. She was also a very talented artist who would sketch out many of her concepts and designs on paper before working on the computer. It quickly became apparent that she had a clear vision for the look and feel of her game interface and would work meticulously on every detail.

She was also the very definition of a multitasker, often working with three computer monitors in front of her and a drawing tablet in her lap. Moira's work habits seemed a bit sporadic. I observed her repeatedly switching from task to task each session, never working on particular element for more than twenty minutes at a time. She openly admitted that she had a difficult time with task management, especially when an instructor was not present to provide direction. By the end of the project, a number of her original designs and concepts were left unfinished; she wished she had had more time to work on them. However, Moira was least satisfied that she had managed to complete a few of her design elements. Of all the participants, her work stood out the most because of her originality and her high production values.

Barbara

Barbara was one of the most energetic and sociable members of the group. Her enthusiasm would often spread to the other participants as she frequently would laugh and share stories with them while designing. However, the majority of these conversations were unrelated to their work. Barbara enjoyed being a part of almost any conversation and would occasionally

take breaks from her work to socialize with others. While she would frequently be the first one to start a conversation, she managed to find a balance between work and socializing.

Barbara came from an art and television production background and was thus quite familiar with working in group settings. Despite her social tendencies, she was focused on her design work, working diligently on her sketches and gameplay mechanics. Like Moira, she also brought her own Wacom digital tablet, art supplies, and personal laptop to the lab for each session. While Barbara would switch from different parts of the project more frequently than the other participants would, she tended to stay on a specific task much longer than Moira.

Barbara spent a lot of time developing the concepts for her game, shifting the main plot and character several times. However, she was adamant that the game feature a strong female protagonist. Much of her time was spent sketching, creating color pallets, and researching character models, which left her with little time to complete the interface. At the end of the six-week period, she felt that much of what she originally set out to accomplish was left unfinished and wished that she had more design time. She also expressed that she had difficulty managing her time between tasks. Due to a lack of an instructor, she was quite happy nonetheless with what she managed to create during her time on the project.

Miranda

Miranda was a diligent, practical, and one of the most consistent workers within the group. Despite having to miss at least three sessions because of work, she showed that she was very efficient at managing her time and workload. At the start of each session, Miranda would open both Adobe Illustrator and Adobe Photoshop and begin working silently on her design. Throughout the six-week period, I observed very little deviation from this pattern, except for an

occasional reference to her design sketches and notes. It should also be noted that she was the only participant that did not listen to music while working on her designs.

Miranda did interact with her fellow participants, but only during the first and final few minutes of each session. In addition, the conversations were seldom related to the project. While she did not describe herself as a gamer, she admitted to frequently playing games growing up and still played games socially with her friends or casual games on her cellphone.

She had a very pragmatic personality, deciding to use a more basic art style and gameplay approach as opposed to the more elaborate style she originally envisioned. Miranda expressed that it was a necessary sacrifice to ensure she would be able to present a finished product by the end of the six weeks. Not only did she manage to complete a game interface on time, but she also included two additional levels: a menu screen and an instruction set. She stated during the interviews that she was not expecting this project to be interesting but that it would provide an opportunity to expand her skills and knowledge. However, by the end of the six weeks, she expressed genuine surprise at how much she enjoyed the experience and even considered the video game industry as a possible career path.

Anna

Anna was an energetic, sociable, and highly self-motivated learner. She would generally begin the first few minutes of each session engaging in conversation with her fellow participants, particularly Barbara, before starting work on her project. Anna would also routinely take short breaks throughout the work sessions to talk with Barbara. Occasionally, these conversations involved getting feedback on her project. The majority of these conversations, however, would quickly switch to non-project related topics. Despite her frequent project breaks, Anna managed

her time well, which resulted in her having a full completed the interface and gameplay synopsis by the end of the six-week period.

Her positive attitude and overall enjoyment was evident throughout the sessions. Anna frequently stated how much she was enjoying working on the project. She felt that she was fully able to test her skills and knowledge without supervision. This often allowed her to experiment and try new methods that she had never previously used. She too was very detail orientated, always striving to ensure that even the smallest details were addressed.

While she claimed that she was not a gamer, Anna did admit that she would play games occasionally, mostly platform games like Racket & Clank. Her game design choices were motivated by the desire to create a game that she would enjoy playing, rather than designing a game for any particular group or demographic. This resulted in a higher level of motivation and self-confidence as she worked hard to ensure her ideal game came to life.

Carmen

Carmen was a very upbeat, thoughtful, and a determined designer, always considering the impact that her design choices could have on the player. More than any other participant, Carmen spent her time researching concepts and ideas for her designs. She was determined to create a game that could be empowering for female players and addressed many of the issues of gender inequality that were often found in video games. However, despite having a clear idea of what her end product would be, Carmen frequently showed signs of having difficulty when trying to create a design that matched her vision. She often appeared stressed, taking long periods of time to review her work, often deleting a design and starting over.

Carmen was a very approachable and friendly person, often engaging in casual conversations during the beginning and conclusion of each session. The remainder of her time

was spent listening to music while she became deeply engrossed in her research and design work. During the interview sessions, Carmen would often take the lead in discussions and would frequently provide examples from her personal life. She was also very concerned with the representation of women in both video games and media in general.

She did not describe herself as a gamer but admitted that she would often play video games whenever her friends or siblings were playing. At the conclusion of the project, Carmen expressed that while she enjoyed working on the project and was happy with her final product, she did feel limited by her lack of experience with game design and software.

Ellen

Ellen had true talent when it came to the details of the project, ensuring that even the smallest parts of a design received attention. She showed a level of consistency and concentration to her work that was seldom matched by her fellow participants. Ellen's interface was a replica of the original arcade version of Ms. Pac-Man. While her design was the only one based on an existing property, Ellen went to painstaking lengths to ensure that her interface flawlessly recreated the look and feel of the original game. One aspect that impressed me the most was her ability to recreate a maze from the game without using any referential materials as a guide.

Ellen spent very little time interacting with the group, only participating in a couple of short conversations during the last few sessions of the study. Generally, at the start of each session, she would open up Adobe Illustrator and begin work while listening to music. However, I would not consider her to be anti-social because she frequently participated in the discussions during the interview sessions. Similar to Carmen, she also expressed concerns regarding the current state of female designers within the games industry. She expressed that she enjoyed

playing video games, averaging a couple hours per week. She enjoyed playing games alone but would play games with her boyfriend and his friends occasionally.

Due to Ellen's highly focused and meticulous nature, she progressed much faster on her design than the other participants, notifying me during the fourth week of the project's completion. She spent the remainder of her time working on details and adding additional content. By the end of week six, Ellen had managed to produce one of the more accurate recreations of a video game that I have ever seen.

The participants were highly capable, creative, and hard working. Each designed their game using the methods and technologies with which they felt most comfortable. Three of the six participants managed to finish their game interface, while the remaining three managed to complete several components showing significant improvement.

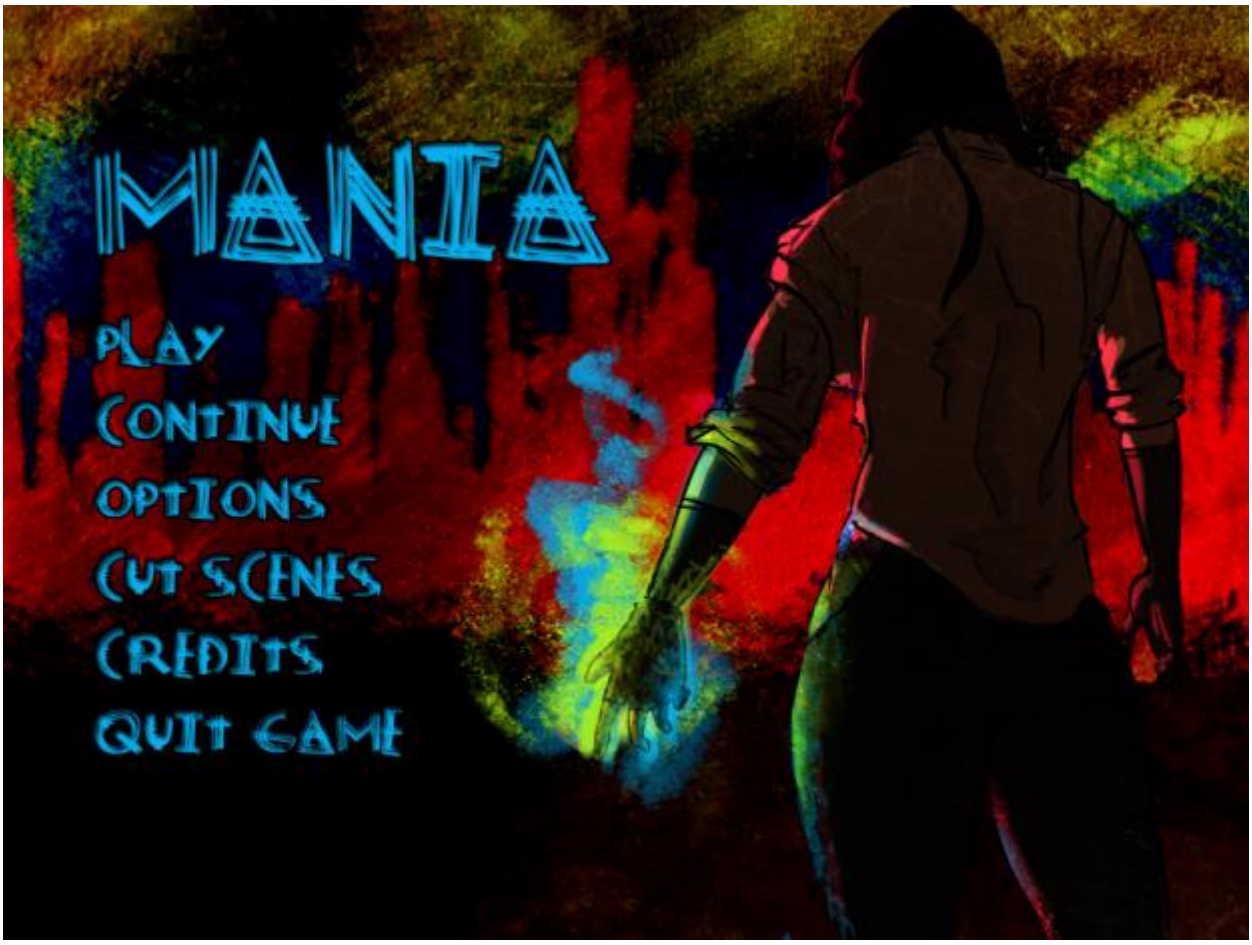

Figure 1. Screen shot from Moira's game "Mania."

Figure 2. Screen shot from Barbara's game "Untitled."

Figure 3. Screen shot from Miranda's game "Mighty Star."

Figure 4. Screen shot from Anna's game "Rembrandt."

Figure 5. Screen shot from Carmen's game "The Academy."

Figure 6. Screen shot from Ellen's game "Ms. Pac-Man."

Themes

There were five themes in this dissertation, which were:

- Social constructionism can facilitate awareness of gender inequity.
- Social constructionism can generate goal identification and identity awareness.
- Social constructionism can be empowering.
- Social constructionism can be challenging.
- Interaction might not be an essential component of social constructionism.

Social Constructionism Can Facilitate Awareness of Gender Inequity

In this study, students had the chance to create their own individual video game interfaces. They had an opportunity to shape a game based on their individual experiences, backgrounds, and knowledge through the lens of social constructionism. However, as I began to explore the background and experiences of the participants, their responses indicated urgency for greater female representation within the field of video games. Their reflections supported a number of the statements made by Kafai (2007) and Besisser (2006), which highlighted the separation between female players, society, and the video game industry.

When the participants were asked to reflect on their own gameplay habits, they reported that video games were more than just an occasional source of entertainment. Each of the six participants stated that they played video games at least once a month, ranging from the occasional monthly game to playing several hours a week. However their gameplay habits tended to fluctuate, with several of the participants stating that they underwent periods of "binge" gameplay, a phenomenon also noted by Ogletree & Drake (2007), when observing the gameplay durations of both male and female college students.

> When I got a 360 I just started bingeing to the point where like I would spend hours and hours and hours playing, to the point where I couldn't play anymore for about a month because I was having school issues, so now I'm back on to bingeing again and I'm playing Fallout III. (Moira, interview #1)

> I don't genuinely play like, I'll do the bingeing kind of like play it elsewhere, I'll play for like two weeks straight and not do anything else and it's really unhealthy and then I'll just have to stop for months 'cause it interferes with life. (Barbara, interview #1)

> Not every week, if I am playing, I'll play for like a couple of hours, like every day but then I'll stop for like a year and then won't play. It all depends if I'm like hey everyone I want to start a new game and then I'll play continuously for a long time. (Anna, interview #1)

The participants also reported that their introduction into video games was not a recent development, as much of our cultural perspectives would lead society to believe (Kafai, 2007). In fact, all participants had been playing video games for years, possessing several dedicated gaming devices in the house (ESA, 2012). The participants reported first being introduced to video games after playing games with either their siblings or friends. Their statements coincided with the arguments made by Besisser (2006), who opposed many of the previous research claims that females were often discouraged from playing video games due to limited access or social pressures from their peers (Lucas & Sherry, 2004). However, not only did the participants have easy access to a gaming device, they were often encouraged by their friends and family members to play.

Growing up I was on Nintendo, I guess it would be 64 and I would play like Mario Cart, Mario Brothers and do the Donkey Kong and Sonic and then I don't know if it was before that or after that but I had a big like handheld Gameboy when it was not in color and then I got a colored Gameboy and I would play like there's like little games like Rugrats or SpongeBob just stuff like that and then the reason I think I played games more is because my brother. He like had consoles and stuff so I just always wanted to be like him, what he was doing and then we had a Game Cube and I played Pitfall and Pacman I was obsessed with Pitfall for a while and then I did the Need for Speed and then now that I have gotten older, I haven't had any like game console but I have played like Xbox like the Call of Duty and then there's some other riding games just because when I'm sitting at the house with my boyfriend and his friends are all playing and I go well turn it on and play so and as far like games now that I play I still have Flappy Bird on my Phone. (Miranda, interview #1)

Well, I think I started with the play station when I was like 8 and all I played there is like Spyro and Crash Bandicoot and finally like middle school my brother got me an Xbox regular one, that's when like Xbox 360 was still pretty big so I was always kind of like behind and I played 1 or 2 games on that and then when I got a 360 I just started bingeing to the point where like I would spend hours and hours and hours playing, to the point where I couldn't play anymore for about a month because I was having school issues, so now I'm back on to bingeing again and I'm playing Fallout III. (Moira, interview #1)

I'd say when I was younger, my brother probably influenced a lot, we had like every game in console as soon as it came out so like we started Nintendo and then Play Station.

> So Play Station -- and then we didn't get in to Xbox. I got an Xbox since I came to college I think, but some of the game – like I play average like a week. I would say like a couple times a week but that's cause like my boyfriend and his friends are playing so that I'm sitting there and I'm like well then I want to play but like the newest game I'd say I played is Grand Theft Auto 5. (Ellen, interview #1)

I was somewhat surprised to discover that the participants would actively engage in conversations about video games, often sharing stories of their favorite moments with their friends and fellow gamers. They would also frequently seek out additional information to help improve their performance such as cheat codes or gameplay walkthroughs. Anna, Moira, Ellen, and Laura all admitted to using the Internet frequently in order to help them complete in-game challenges and achievements. Ellen would even go as far as to purchase the official game strategy guides.

> I'll be like looking for these keys and I can't find them, so I Google, like I look up like the walkthrough on YouTube and to find like where you could get the key. (Anna, interview #1)

> Yeah. I've been going as far as to buy like the books that they have out there for advantages and cheats and all that. (Ellen, interview #1)

In 2012, the Entertainment Software Association (ESA) released a report on game player demographics. The report showed that female players comprised almost half of the overall gaming population. However, based on the statements made by the participants of this study, I would argue that the impact of female players goes beyond simply playing the occasional game (Kafai, 2008). Females are no longer a minority game playing population; instead, they are close to being equal partners with males as active participants (Terlecki et al., 2011). It is because of

their ever-increasing involvement with video games that the participants of this study became actively aware of many problems currently confronting the industry. Their opinions were closely shared by Kafai (2008) when she stated that the majority of video game marketing still remains almost exclusively focused on catering to male demographics. This decision has left female players with little no voice within the industry (Carr, 2005). This lack of representation had not gone unnoticed by this study's participants, as they identified several problems they had with both the development and marketing of video games.

During the course of the study, I frequently heard the participants making the reference "female gamer or game." I decided to ask them to explain what it was that they perceived to be a female game or gamer. Carmen was the first to speak up. She felt it was necessary to explain that she did not perceive females as any special group. Rather, she stressed that both the industry and society should not try to categorize females as being "female gamers."

> I think that a female gamer – game, just like the term gamer it's very broad. I would hate to be put into a box because I'm a female and be told that I like certain types of games because I'm very eclectic, I like every type of game and when I thought about a game that I would like to play as a female, I thought about popular games that are out there now and how I would prefer to see it. (Carmen interview #1)

Both Moira and Barbara supported Carmen's statements, adding that they felt there were no major differences between the genders, and that they played similar games that their male counterparts would, including; Fallout 3, Skyrim, Assassin's Creed, Call of Duty, Dead Island, Team Fortress 2 and the Walking Dead.

> When I think of female games, I think of female issues, so it would be a game that is based off a female issues and most games, I kind of see is genderless. (Moira, interview #1)

> Most of my female friends also play the same games as my guy friends, like I don't really see any type of differentiation except for Call of Duty because every 16 year old boy that plays Call of Duty does not want girls to play Call of Duty so that aside, just eliminating Call of Duty from that discussion. I don't really see a difference between female and male games. (Barbara, interview #1)

Their statements support similar arguments made by Flanagan (2005) and Hartmann and Klimmt (2006), who stood against the idea of trying to classify female players by the type of games they play, such as single-player versus multi-player games. Just like the participants in Flanagan's (2005) study, the participants in my study chose which game to play based on their current surroundings or gameplay desires. Both Moira and Barbara recalled previously choosing to play multiplayer games because it can be fun to play games with friends. Sometimes, however, they preferred to focus on a story-driven, single-player game. For Carmen, playing multi-player games were a part of a social function.

> For me it depends. If it is a game on my phone, I play it by myself because that's usually a one player game. But if there's a game like we or Call of Duty which is my friend's favorite, I play it when we're all together and I want like to join in on the fun cause they're all so absorbed into it and I'm just sitting there like. So I join in for social things and like just have fun. (Carmen, interview #1)

The participants' descriptions support the statements made by Brar (2012), Hayes (2005), and Dickey (2006) that the current method of attempting to classify players by their gender was

deeply flawed. By failing to include additional variables, e.g., player interest, background, or experiences, society is making the assumption that all female players have similar interests and backgrounds (Carr, 2005). By attempting to stereotype female players' backgrounds and game interests, particularly in the way that games are marketed to female players, game designers are limiting their potential market and alienating their customers (Denner, Bean, & Werner, 2005; Hartmann & Klimmt, 2006; Thornham, 2008).

In fact, the participants described three major issues they felt were hindering female representation in games. These issues were (a) a lack of distinction between the ages of female players, (b) a lack of female presence within the marketing, and (c) the use of the female figure to market games.

> I think they're being a bit too ambiguous with that. I think if there is a distinction, it should be between girls and women because whether you're marketing this to a girl and you're saying girls and I don't know if you're including me or not, and you're disrespecting me just a little bit, or you're gonna split it and market it towards me and you have a market towards girls, then I wouldn't feel so dis-respected. And then when it comes to female games that are targeted to females, like with that little commercial or blog or whatever we saw, [referring to a Nintendo advertisement she viewed outside of the study, and shared with her fellow participants during the interview on her smart phone] those games weren't marketed towards me. They're marketed towards like my niece. I feel like games that they make for females are marketed towards children and its like, "Don't insult me." Like I have to really sit there and virtually brush this dog. (Carmen, interview #2)

The idea that every female player could be placed into one all-encompassing group rather than in separate demographics was strongly contested by Barganza (2011). Both Barganza and Royse (2007) argued that misrepresenting female games would generalize the market, leading to the creation of "girl games." These games would be stereotypical representations of the female demographic working off the assumption that the majority of female players would enjoy the same game. The problem with such a vision is that it fails to take into account the various backgrounds, opinions, and experiences that shape individual preferences (Royse, Lee, Undrahbuyan, Hopson, & Consalvo, 2007). Why should females' preferences not be shaped by the same types of forces that shape males? Based on the observations and statements gathered from the participants of this study, most participants strongly contested the idea of "girl games," Carmen and Barbara in particular. They felt that many games currently marketed towards a general female demographic would only appeal to a fraction of the market, in this case younger audiences. "Girl games" would fail to address the interests of adult female players.

> I feel like a lot of the games are geared towards men and boys. They don't have to scream boys. In that commercial, that girl was basically screaming, "Girls! Girls! This is for girls! We like girls. Girls!" I don't know. I feel like they're not stupid enough to believe that a grown-ass woman is gonna play that puppy game. (Barbara, interview #2)

An additional area of concern that the participants frequently referred to was the lack of female representation in the promotion and marketing of games. Barbara, Anna, and Carmen all noted that the majority of ads that they had seen in mass media were all targeted exclusively to a male audience.

> I've noticed that games that seemed to be more creative for men are obviously marketed towards men. So, the games that I sometimes enjoy like Call of Duty, they have the male voice speaking in terms that it's more identifiable for men than for women, and I'm sure that they designed the game for men so they don't really care about advertising towards women, but it's a little bit frustrating because it's something I started to notice. (Barbara, interview #2)

> Yeah, I think like when you see like a commercial for a video game, it's like… Even like the music and like the graphics or voice over like it all just seems like leaned more toward. (Anna, interview #2)

Carmen added, that while some advertisements did not seem to target a male audience specifically, she could not help but notice the lack of any female characters represented in the ad or the gameplay itself.

> Here are few commercials that are about some… They're like multi-player online games and things like that and I recently started to like watch for them and like notice them, and there are some that I actually like and I would start playing. Like there's this one that allows you to go back in time and like create your own village but you're back in time. It's complicated. But I like it and I would think about joining it but most of the characters in the game in the commercial are men. You have a male protagonist like a leader or something like that. You don't even see women in this commercial at all. (Carmen, interview #2)

The participants' observations strongly supported the arguments made by Kafai (2008) and Thornham (2008) that the majority of video game advertisements were still designed to target solely male players. Denner, Bean, and Werner (2005) argued that because of these

practices, much of the game industry continued to rely on targeting traits that were associated with a male audience stereotype (Thornham, 2008). One of the biggest offenders in the minds of the participants was the use of sexualized female characters in order to attract a male audience. Moira was quite outspoken about the use of woman as sexualized characters and that she perceived a bias towards using women to entice male players rather than contributing to the game itself simply as women.

> It was usually towards dudes. They have like… It was just a commercial for it but it was like a female zombie in a bikini and it was just like, "Really? She's a zombie. I really don't care about her boobs right now. She's trying to eat me," so, that kind of stuff. It just felt like they don't particularly care about the women, it's more towards the men. ? I would play it if there were just naked people, that fine, but…. (Moira, interview #2)

Hannah and Ellen added that they have recently noticed another new trend in which women are used as the "token hot girl player." They felt this was the video game industry trying to represent the female demographic and failing at it. Ellen concluded that these ads typically featured a single female character, generally represented by an attractive actress or model, among a large number of male characters.

> They're going off with that in like the Call of Duty thing. Whenever they have those commercials where they like show people like as if it's like them really playing the game like the combat, it's always like a group of guys but then they'll show like one girl and it's like, "Oh, I'm the bad-ass chic. I'm just come in to kill all of you." But it's like why is there only one? There's definitely way more women that play the game. (Ellen, interview #2)

> In their advertisements when they do have women like in the Call of Duty, they're always attractive. They might not be completely made and looking like models, but they are attractive girls as if girls that are not super-hot that played these games don't matter which is frustrating. (Barbara, interview #2)

Carmen also noted that while female players are gaining a larger presence within the media and marketing, they are also being subverted by the video game industry and used to turn female players into "sex symbols."

> And like I was looking up female gamers and I went to the images of it, like it starting to become like this sex symbol type thing. Like if you see… Like they have pictures of this girl who is like playing game, she was in lingerie and apparently that's extremely sexy because you're a girl but you play games with the guys. So, that's like there's a stigma now that's becoming attached to female gamers because now, that's extremely sexy, but now because that's extremely sexy, you have to portray as an extremely sexy female. (Carmen, interview #2)

These observations coincided with Yao, Mahood, and Lidz's (2010) arguments that the game industry often used female characters as marketing tools rather characters integral to the game. Hayes (2005) goes further by stating that when women are used as a marketing tool, they are more prone to oversexualization in order to attract the male demographic. This study's participants were not only well aware of this issue but frequently stated this was largely due to the lack of female designers' within the industry itself.

> Hire more females and you might see a decline in stupid games. Like a zombie game where all the female zombies had like little eeny teeny tiny bras on and all the male zombies are just you know normal trunks. Like the volleyball games. (Moira, interview #3)

The solution that all six participants seemed to agree upon to fix this issue was to increase female presence within both the design and marketing of games. Moira, Barbara, and Carmen stated that an increase of female game designers would help to draw attention to many of the problems that they previously identified as oversexualization.

> I agree that we should probably hire more women. My question is if anyone has any idea if they actually do like focus groups with women because I feel like even if they were like previous to the release talking to women about these games a woman might say, Hey, why are there so many boobs like this is a little odd don't you think? And completely unnecessary in selling a videogame that women might actually want to play in their lives so yeah. (Barbara, interview #3)

> "Well, why do you think there is minority?" Because they don't hire females and if you don't have female designers, female developers, you're not gonna get that half of the mindset that you need for your marketing, plus the marketing is probably run by males because it's dedicated towards males. Once you get half of your workers to be your target audience, then you're probably gonna change how you make games. (Moira, interview #3)

Miranda, Carmen, and Anna supported the idea that marketing groups should expand the current female demographics to include a wider range of backgrounds, ages, and experiences.

They stated that doing so would help to provide a more accurate representation of females in games.

> Focus groups, having those are really important just to get a female perspective and having characters in a video game female characters in a video game that are like that their skin is all out and they are wearing provocative clothing. Honestly I don't think if they put clothes on a female a guy is going to look at the game and go "well I am not going to play it now." So honestly I think that it will satisfy both parties. I don't think that it will affect marketing like the revenue and the income of a game that is my personal opinion. (Miranda, interview #3)

> I think it would just be a wise decision for like marketers to interview women like in all age spectrums just like get their opinions because they are not going to make anybody angry. (Ellen, interview #3)

> I agree like whether it is like hiring more women in that field or just like talking to them like focus groups or interviews just to see like the opinion there. (Anna, interview #3)

The six participants also noted that while they had observed an increased acceptance of female players within our society, the video game industry itself had yet to reach the same level. They reported feeling repeatedly marginalized and misrepresented by the game industry's marketing efforts, which often stereotyped female players as having the same game preferences (Kafai, 2008; Carr, 2005; Brar, 2012; Yao, Mahood, & Lidz, 2010).

Social Constructionism Can Generate Goal Identification and Identity Awareness

Social constructionism, constructionism, and user design share many of the same foundations as problem-based learning (Almeida, 2008). Their central tenant is that knowledge

cannot be simply transferred from one individual to another. Rather, knowledge is designed, developed, updated, and customized to the individual perspectives of the learner (Papert & Harel, 1991). Because their new knowledge base has greater personal connection and significance in their lives, learners become better engaged in the learning process (Savery & Duffy, 1995; Ackermann, 2001).

The challenge then for educators is to create a problem for the learners to solve that engages and motivates them to use their own prior knowledge, experience, and skills sets (Kuruganti, Needham, & Zundel, 2012). It is essential for educators to introduce goals that are clearly measurable yet personally significant and meaningful to the learners. The participants' statements coincided with Kuruganti, Needham, and Zundel (2012) and expressed their need for clear goals in order to evaluate whether their own skills abilities would meet the requirements.

> If you didn't know what exactly what the professor wanted, and then you'll be like here's my finished product and the professor will just be like –no that's not finished. (Moira, interview #3)

> I appreciated the freedom but like when someone is telling you how much you want to achieve at the end of 6 weeks. Then I know how much I am expected to create and how much I am capable of achieving. (Barbara, interview #3)

> I like being told what to do sometimes. It's hard to just be like "Make a game", well well what kind of game? What kind of story? Please give me some information! (Moira, interview #3)

Once the participants were aware of their goal, the challenge then became to identify what was required to meet it. However, unlike similar studies conducted by Kafai (1996),

Almeida (2008), and Hyeon Woo (2012), the participants of this study were required to construct their artifacts without any form of instruction. This required a much greater degree of self-regulation on the part of the learners (Harris & Shelswell, 2001), who were forced to identify the skills and knowledge required to design a game interface yet were evaluating themselves to determine design knowledge gained.

The participants of this study had one distinct advantage against previous studies conducted on younger female demographics (Beisser, 2006; Kafai, 2008). Each of the six participants came into the project with an extensive background in production. The participants' production experiences ranged from television and radio production to photography and graphic design. Out of the six, only Moira had previous game design experience.

It was clear that having prior production experience was of great benefit to the participants. They entered the project already having worked on numerous other productions that required project management, pre-production, editing, group collaboration, and project deadlines. From a social constructionist perspective, having a wide range of skills, knowledge, and experiences can be of great use for the group potentially to share (Harris & Shelswell, 2001).

Based on my observations, the participants drew upon their prior production experiences and used them as a baseline to establish their strengths and weaknesses. By the first interview session, each of the participants presented a clearly thought out image of self-identity. For the majority of the participants, there seemed to be little hesitation as they defined themselves as designers first and developers second.

> I'm more of a designer rather than a developer I learned – I had like a few classes where like in animation class and videogame design class where you know start from the bottom and I would like above and beyond in my head, like it's going to be this and then when

> you're actually making it – it's just oh, no I can't do half of that and I end up with a game that I'm not happy with because I couldn't make it like how I wanted it. (Moira, interview #1)

However, the reasoning behind their individual designations varied between the participants. Moira, for example, came into the project as the only participant with prior game design and development experience. She also exhibited a highly creative and detailed orientated personality. She exhibited great joy in designing the look of her characters and the world that they would inhabit. However, she expressed frustration whenever she lost creative control over her own work, as she had experienced during previous class projects.

> I like the fact that I can do a back story and I can do basically whatever I want, like usually I like being told okay, I want you to draw me this but when you can actually like create a whole new world by yourself and not be told, well this sucks try again so, its nice. (Moira, interview #1)

The freedom that Moira experienced through social constructionism provided Moira with a sense of ownership (Alimisis, 2007), which encouraged her to pursue her passion for design. Her experiences closely coincided with Reigeluth (1999), who encouraged instructors to enable students to customize their work rather than force standardization upon the entire class. Moira's experience showed that when she was presented with the freedom to create her own design without faculty oversight (Freire, 1968), she felt enabled and more confident in defining her own identity as a "designer, rather than a developer."

For other participants, their self-identification as designers came from a preference towards design and also an understanding of their limitations. Carmen and Barbara expressed the former by being creative, high concept thinkers and by expressing genuine excitement in sharing

their design ideas. Both planned to create an elaborate game that would feature a strong female protagonist and yet still be accessible to female and male players alike.

> When I was like trying to think of games ideas, I'm thinking like the same thing with Barbara like just female based games like screw the male gamer, this is for girls and then I thought, well I usually like games that are like genderless so you can choose either gender like in Fallout or Skyrim and it doesn't really matter, it doesn't ruin the game in any way so I ended up going with that even though technically the protagonist should be a male, cause there's certainly – can't tell you yet cause it's not finished but like there's just certain things in there it's like that would usually be a male but it can be a female, it doesn't matter. (Moira, interview #1)

Carmen also felt liberated (Freire, 1968) by the lack of an instructor and the use of constructionist methods. However, she moved from the conceptual phase into the early developmental phase of the project, she began to comment upon her limitations. The participants expressed concerns that even though they felt liberated, their lack of game design experience combined with limited knowledge of the necessary software hindered their efforts.

> I definitely think of myself as a designer and I don't think it's because as much because I like designing but because I don't have experience developing. It's really hard to get classes or find a way to learn how to do a lot of the things that you need to do when making videogames and I would love to learn how to do more developing and I think I would enjoy it a lot more but because I don't have any experience almost at all. (Barbara, interview #1)

> I can conceptualize something and they can put it together better and if they were given a program and they didn't really know how to work it, they would probably be able to

> figure it out better because they know the world a little bit better than I do like they understand virtual worlds and building stuff like that and I don't but that speaks to my experience over these past two weeks because I've been trying to figure it out as like been thrown into this. (Carmen, interview #1)

Similar to Kafai's (2006) study, both participants seemed to be fully engaged and excited about the opportunities provided by a constructionist approach, especially because of the liberties allowed in creating their own game. They frequently expressed how exciting it was to create a "bad-ass" female protagonist for an elaborate adventure. However, because of their limited experience with game design software, the pair felt hindered (Chin & Rosson, 1998), and concerned that they would be unable to bring their vision to full fruition. I believe that their statements revealed an area of concern for instructors planning to implement constructionist methods within the classroom. The pair felt isolated without an instructor present to provide feedback or assistance hindering their ability to complete their initial design.

What I found most striking is that despite their concerns, neither Carmen nor Barbara reached out to their fellow participants for assistance. Their experiences seemed to contradict the observations made by Beldarrian (2006) and Alimisis (2007), who suggested that through social constructionism, learners would be more encouraged to share their collective knowledge and experience. It is possible that Carmen and Barbara felt more isolated than Alimisis's (2007) group, because each participant was designing their own individual game, rather than a shared group project. Without a shared goal (Bruckman, 1998), perhaps, there was less incentive to work collaboratively creating a greater desire to concentrate on their own projects.

Since the beginning of the project, Miranda, Ellen, and Anna all stated that they had a very clear idea of the type of game that they wished to create. Their priority was to design a

game that they would enjoy playing themselves. Their identification as designers paralleled that of Carmen and Barbara. The three stated that they felt more inclined towards working as designers rather than developers but also expressed concern that their limited game design experience could be a hindrance. Miranda and Anna put it eloquently.

> I can think of the best thing to draw or the best thing to do but as far as actually getting to the computer and drawing it and doing it – No, I'd rather be that idea for somebody else and just help them draw it. (Miranda, interview #1)

> I think it's both but for me I think it is more on the experience level cause like when I'm like told to create something I like automatically start like brainstorming in my head and I'll like sketch it out and everything and then like when I go to do it I'll have to like play around with new tools and like it takes longer and then like the way I want to do it I can't do it because like I don't know exactly how the tool works or something like that so. (Anna, interview #1)

However, the key difference for them was their attitude. Rather than worry that their lack of experience was going to hinder their final game design, they instead chose to focus on their strongest skills. Coincidentally, all three participants stated that because of their extensive backgrounds in graphic design and digital photography Adobe Illustrator and Photoshop seemed to be the best options for their designs. In fact, Miranda stated that by using a more simplified art style and concentrating on specific programs with which she was familiar, she was more likely to complete her project on time.

> I have more of a basic route. I could envision like a great idea all day of like something similar to Call of Duty or something like that but I know what it's going to look like if I get on there and try to draw it and make it happen so I did something that I can do. (Miranda, interview #3)

Ellen and Anna also, chose Illustrator and Photoshop as their tools of choice because of familiarity.

> Right now I have an assignment due today actually that was a shoe design for my advanced graphics class but I think like with this game design interface I'm making now, it definitely is like because of this classes that I'm taking because I'm using illustrator and Photoshop and that's just the program I'm – Illustrator is what I'm using for making this interface. (Ellen, interview #1)

By establishing a sense of identity early on, the participants were quickly able to gain a sense of ownership over their project (Papert, 1991). Similar to the participants in Almeida's (2008) study, Miranda, Ellen, and Anna were all able to recognize their strengths and then make the necessary decisions to ensure their designs complemented those strengths (Kensing & Munk-Madsen, 1993). I would also argue that their actions and statements helped to defend Simons and Ertmer's (2005) and Ackermann's (2001) arguments that social constructionism is closely tied to problem-based learning. By providing the learners with a problem to overcome, in this case designing a 2D game interface with no instructor present, the participants were forced to establish a sense of self-identity or rely upon an already established sense of identity which in turn, bounded their expectations, their activities, their relationships and ultimately their outcomes (Kuruganti et al., 2012) and engage in self-efficacy to determine the best solution to overcome the problem (Hyeon Woo, 2012; Kilroy, 2004).

Based on my observations and the statements made by the participants, I believe that each of the participants demonstrated an accurate account of their strengths and weakness and an awareness of how it directly shaped their experiences over the six-week period. Despite the variety of challenges that they faced, the participants used their self-awareness to confront it, enabling themselves to generate new levels of knowledge (Papert & Harel, 1991). The freedom that social constructionism allowed enabled the learners to incorporate the skills and experiences that they considered relevant and personally meaningful (Ackermann, 2001) and from that, they gained a greater sense of self-confidence and empowerment. Anna, Moira, and Miranda summarized the project by stating that by participating in the study they gained a better sense of their capabilities and how they might apply them in the future.

> I think it was fun also, and I liked it mostly because I was learning a lot of like the tools in Illustrator like I was like I kind of already knew how to use it but I learn even more how to use it so. Like I have like a method to things now like when I'm making things in Illustrator where before it was kind of like trial and error. (Anna, interview #3)

> I like I became more confident in Photoshop and its just – it honestly surprises me because like for assignments, they don't specifically say okay if you use this tool, you have to do this for this shape or whatever but I'm finding myself mixing things and kind of like a trial and so it has definitely made me a lot more confident and oh well, I know what I can do this because when you use this tool, dragging things from Illustrator to Photoshop and yeah – it's definitely you know helped. (Miranda, interview #3)

> For me, it is helping me narrow down my choice of career that I want to go into cause at first I was like I just want to do storyboarding and character development and character

> development could be in games but also creating the game itself like the back story, all that stuff, that kind of was just like you can do this if you want probably might not really want to cause certain parts was just, I knew what was it. There was something like I knew that this certain job was a job in itself and I thought to myself I shouldn't be doing this and that kind of basically told me – you shouldn't be doing that part of anything if you ever want to work in this because I just get angry and no one likes angry people. (Moira, interview #3)

Social Constructionism Can Be Empowering

Over the last two decades, theorists such as Papert (1991) and Alimisis (2007) have urged instructors to implement constructionist methods in their classrooms to enable and challenge learners to construct artifacts. One of the most popular methods utilized has been the use of game design (Alimisis, 2007) because this often generates a boost in classroom participation and learner motivation. However, Moreno-Ger (2008) warned that simply having students create a video game is not enough. Without a more significant connection, learners would likely fail to find relevance between their task and the course materials (Van Eck, 2006). In order for both constructionism and game design to work as an effective educational tool, learners must be able to bridge the gap between the classroom formal protocols and themselves (Alimisis, 2007) and find a way to give the project personal significance (Papert & Harel, 1991). By providing learners with a sense of empowerment, students take ownership over content creation (Papert, 1991; Alimisis, 2007; Reigeluth, 1999) resulting in gratification.

Following Papert's recommendation (1998), I informed the participants that they were free to use whatever technology or equipment they deemed necessary to complete the project. Additionally, I stated that there would be no faculty oversight, which meant freedom to design

their interface around any topic that they wished with no opposition. The feedback that I received from the participants indicated that their design experiences were liberating (Freire, 1968). For many of the participants the freedom that social constructionism provided enabled them the rare opportunity (Almeida, 2008; Kafai, 2006) to express the ideas and topics that they wished to cover (Savery & Duffy, 1995).

> I like that there are no time constraints and I can work on my own pace. The freedom of doing if we can anything we want plus, we have a lot of time, more than we know what to do with. (Carmen, interview #1)

Moira provided a prime example of how through social constructionism a participant can integrate content that is engaging and personally significant. Moira did not wish just to create a clone of an already existing title. Instead, she wanted to address an issue that had greater personal significance to both her and her family, namely schizophrenia.

> I ended up… My game is about schizophrenia and I have family members who have schizophrenia, so there's a chance that I might get it which is not fun, so that's why I was researching it. And I keep on, even out of class, I keep on still looking at schizophrenia items and stuff, and… I don't know. I didn't expect that to happen because in the beginning, I was gonna do a game about the boogie man and children killing--well not really killing--but defeating boogie man and stuff. And then I was just like, "No, let's go darker." And then it got darker, and I'm like, "I don't like this." So, yeah, that was depressing. (Moira, interview #2)

While she did not appear to be overly worried that she would develop the condition, I did sense that she had spent a lot of time thinking about it. Moira's descriptions closely coincide with Ackermann (2001), who stated that the greater personal connection a learner can create

between themselves and the project, the deeper their immersion and engagement will be. By enabling Moira to choose the topic of her own game, she used the project almost as a coping mechanism. It was a way to create a deeper personal connection to the project and feel empowered to confront an issue that was a major concern for her and her family (Holbert, Penny, & Wilensky, 2010; Gee, 2007).

For Barbara and Carmen, the freedom to design was an opportunity to address problems and concerns they had with the ways females were being represented in the video game industry. Throughout our interviews, all six participants expressed frustration with female representation in video games, but it was Barbara that frequently was the most outspoken on the issue. Barbara expressed her frustrations towards what she considered to be a lack of strong female protagonists within the video game industry (Kafai, 2008).

> I've noticed that games that seemed to be more creative for men are obviously marketed towards men. So, the games that I sometimes enjoy like Call of Duty, they have the men voice speaking in terms that it's more identifiable for men than for women, and I'm sure that they designed the game for men so they don't really care about advertising towards women, but it's a little bit frustrating because it's something I started to notice. (Barbara, interview #2)

Barbara would later provide her solution as she explained the idea behind the game she planned to create.

> I found that after drawing down my first like different couple ideas for the games, I was extremely drawn towards the idea of female protagonist based games like little red riding hood themed. The game I'm working on now, I'm trying to have a female from the 50s defeating zombies and like saving the world like its female based and now that I think

> about it cause I didn't really think about how men might think of it. I don't think I care how men would see it. I just know that I think women would like it and I guess that that occurred specifically because I'm a female gamer and I have frustrations with the fact that every game I play and it seems interesting and has a lot of money thrown at it as always with the male protagonist with the same exact goals so. (Barbara, interview #1)

Based on Barbara's statements, it appeared that she viewed the opportunity to design her game potentially fulfilling a personal mission. Her game served as a mechanism to address the issues of female representation that Brar (2012) and Kafai (2008) once considered a hindrance in the field. Carmen and Moira also shared similar frustrations towards the representation of women in games. Initially they wished to create a game that focused only on female players. However, they came to the realization that gender representation really did not play a contributing role in their game choices. These realizations resulted in Moira and Carmen adopting game designs that were open to both male and female players.

> When I was like trying to think of games ideas, I'm thinking like the same thing with Barbara like just female based games like screw the male gamer, this is for girls and then I thought, well I usually like games that are like genderless so you can choose either gender like in Fallout or Skyrim and it doesn't really matter, it doesn't ruin the game in any way so I ended up going with that even though technically the protagonist should be a male, cause there's certainly – can't tell you yet cause it's not finished but like there's just certain things in there it's like that would usually be a male but it can be a female, it doesn't matter. (Moira, interview #1)

> My game is called the Academy or Acad for short. It is basically it's got a squadron of female soldiers as a part of the government owned military sector or whatever like that

> and they're actually trained special ops because a lot of females are not allowed in certain special ops. So they are their own group of special ops and my caption on this is "before the call of duty is made there was… or something like that. In the game you are also allowed to have like a male avatar who comes in and like works with them also so it's not just strictly for female you have the ability to work as a male or something like that but of course they are not part of Acad, they're like they're just there. I was inspired by Call of Duty. (Carmen, interview #1)

Moira's response surprised both Anna and Miranda, because it caused them to realize that their game design had not even considered issues of gender representation.

> I didn't even realize this until now, but my – I don't have any female characters in my game and I think I'm just kind of like creating it as the game that I would want to play and I guess maybe because it is sort of like Super Mario inspired, the main character is a guy and so I just made mine a guy. (Anna, interview #1)

> With my game, I don't even have any human characters so I have a star and it's not either female or male so I kind of like what you said I kind of was just thinking like this is something that I would play, this would be something that would be fun so that's what I went with. I didn't really go with making a female game or male game. (Miranda, interview #1)

These results have advanced the findings of Hartmann and Klimmt (2006), who noted that character gender was rarely a deciding factor for female players or designers (Kafai, 1994). After realizing that their game designs failed to consider issues of gender representation, Anna and Miranda explained that their desire was to create a game that they personally would enjoy playing. I believe that the former statement exemplifies the ideas of both empowerment and

engagement introduced by Papert (1991), which was, he emphasized, so crucial for constructionist learning to occur. Clearly, the participants found themselves capable of taking further ownership of their work (Alimisis et al., 2007), integrating the ideas, experiences, and causes that they considered personally significant (Reigeluth, 1999). Self-empowerment made the participants more confident that they could use their new knowledge and skills to identify and start addressing relevant real-world problems (Hmelo-Silver & Barrows, 2006; Othman & Ahamad Shah, 2013; Papert & Harel, 1991) when creating a game artifact.

> Yeah. Like I have like a method to things now like when I'm making things in Illustrator where before it was kind of like trial and error like I still didn't know exactly what I was doing. (Anna, interview #3)

Based on their statements, the participants' sense of empowerment was not solely derived from their freedom to design their 2D game interface. Throughout the six-week period, all six participants described a sense of liberation that they received because there was no instructor present during their work sessions. They went on to explain that without an instructor present, they felt they were truly themselves. Barbara and Carmen even shared that in the majority of their previous production and art classes, the instructor would constantly be walking around the room, looking over their shoulders, controlling their every move. They described the constant presence of the faculty member as nerve-wracking, causing them to second-guess the quality of their work or progress.

> I appreciate not having a faculty advisor around, because okay when you come in, I felt like I'm moving too slow or like there's pressure on to always be doing something. So, if I sit, and I stop, and I think, or I'm trying to envision something in my head and figure out

> how to put it this like, “Oh, maybe I should appear like I'm working.” (Carmen, interview #2)

> I had that too, when Juengel is walking around and I'm like it’s looks really dumb and I was doing it at the very beginning of the sketch and I have nothing done and he’s gonna think I'm horrible at this. (Barbara, interview #2)

Without a faculty member constantly looking over their shoulders, the participants stated that they felt like it was acceptable to listen to music without repercussions and that they could stop and chat with each other if they liked. Ellen, Moira, Anna, and Miranda reported that when there was no instructor present, they felt more confident to take ownership over their project. Ellen and Moira described feeling that they were no longer “constricted” by an instructor’s teaching style or preferences and that they now could create the game they wanted to make.

> I like the fact that I can do a back story and I can do basically whatever I want, like usually I like being told okay, I want you to draw me this but when you can actually like create a whole new world by yourself and not be told, well this sucks try again so, its nice. (Moira, interview #1)

> I definitely agree with the freedom, sometimes whenever you’re constricted, it makes it harder to come up with an idea and then but like even though I’m doing like kind of copying Ms. Pac-Man basically but like if I had certain instructions, it would make it harder for me to like even pick a certain like theme or subject as to where to start. (Ellen, interview #1)

Anna and Miranda added that they felt free to try alternative approaches to using Photoshop and Illustrator, because they were no longer restricted to following the exact path

dictated by an instructor. They stated that through their experiences during this study they were able to gain a better understanding of both the software and their own design abilities. The experiences described by the participants were strikingly similar to the observations made by Almeida (2008) in which the participants displayed an increased sense of empowerment as they reflected on their own learning in an attempt to construct a better artifact. The participants clearly created content as they went (Barrows, 1986) by demonstrating self-reflection as they explored the impact made by their decisions and the new knowledge that was created as a result (Othman & Ahamad Shah, 2013).

> I was learning a lot of like the tools in Illustrator like I was like I kind of already knew how to use it but I learn even more how to use it so. Like I now have like a method to things now like when I'm making things in Illustrator where before it was kind of like trial and error. (Anna, interview #3)

At the conclusion of the six-week period, the overall consensus among the participants was a mix of enjoyment and satisfaction. Anna, Miranda, and Ellen all managed to complete their interface within the timeframe. Moira, Barbara, and Carmen had several completed components of their interfaces, despite some frustrations due to being unable to finish their designs completely. In fact, each admitted feeling a sense of pride in seeing their prototype.

For Anna, Carmen, and Miranda, their enjoyment came as a genuine surprise. Each had described a sense of apprehension about the project in week one, worried that their designs would be dull and repetitive. However, at the end of week six, they could not help but express a sense of curiosity. This was similar to the results reported by Kafai (2006) in which participants were introduced through social constructionism and game design to potential technology based career paths (Baytak & Land, 2011) that they had not previously considered.

> I surprise myself with liking it cause I don't know if – I don't have any background in video design but I guess like hearing it – it sounded so dry, I'm like that's not going to be fun and I did it and I'm like all right, I mean this like I can imagine doing this like as a profession. (Miranda, interview #3)

> It was pretty fun and it shows me that I'm able to do a lot of things if I put my mind to, and I didn't think that I'll ever enjoy putting a game together or in some ways, shape or format but I enjoy it. (Carmen, interview #3)

> I feel like it would be a fun job to have. Like I never really – I never really thought that I would have liked to go into that field. (Anna, interview #3)

Social Constructionism Can Be Challenging

Constructivism and social constructionism can serve as powerful tools to reform our current educational system (Papert, 1991). They provide an opportunity for learners to integrate the information covered in class, generating experiences that are both deeply engaging and personally meaningful (Alimisis et al., 2007; Ackermann, 2001). It can also act as a gatekeeping tool, providing learners an introduction to topics such as math or computer science that they might have previously considered beyond their reach (Stager, 2005).

However, constructionist methods are not without flaws. Social constructionism is design and according to Norman (2002), design can be very challenging for students. In addition, both constructivism and social constructionism have a reputation for being very difficult to integrate fully into classroom settings (Bers, 2002). Constructivist methods focus on generating learning experiences that are customized to individual learners, using their own past knowledge, abilities and experiences to generate a new knowledge base. This new collection of knowledge is unique

to each individual learner, making it increasingly difficult to standardize each individual's learning experiences to an entire classroom or school system (Jonassen et al., 1995; Bers et al., 2002).

For the participants of this study, the challenges they faced were often unique to their own individual experiences and backgrounds. For the majority of the participants, this study provided the first opportunity for them to develop a video game interface. For one participant, this study was her first major project without any oversight from an instructor or manger. Interestingly, my notes and observations indicated two common issues that repeatedly challenged the participants: meeting expectations and project management.

> It's still weird not having a faculty advisor around all the time especially in the Comm. Department. It's always someone looking over your shoulder and not having that, not having someone interrupt and ask me how I'm doing and help me develop things, I have to be that person for myself and I'm still learning how to do that. (Barbara, interview #2)

Since day one, the participants expressed a genuine excitement over the prospect of getting to design their own game. In fact, Ellen viewed the experience as the perfect opportunity to expand both her design skills and portfolio before she graduated. Barbara took this experience as a chance to create an elaborate story featuring a "bad-ass housewife fighting zombies." For the majority of them, the challenge was not conceptualizing their game but rather ensuring that their final projects met their expectations (Papert, 1991). Miranda originally planned to create a game that would feature highly engaging and interactive levels, but later realized that she did not have the necessary skills or time needed to complete her game. Instead, she chose to focus on a more basic art style and simplified gameplay, which allowed her to finish the project by the end of the six-week period.

Figure 7. Screen shot from Miranda's game "Mighty Star."

Despite her insight and ability to accurately gauge her strengths and weaknesses (Kensing & Munk-Madsen, 1993) while designing, she still expressed frustration that she could not pursue her original game concept.

> One of my biggest struggles was I felt like I could only add so much to the game because I did not want to over crowd. And I kept getting frustrated because I kept looking at it and it just seemed so like basic and plain but after I was finished I mean that's kind of what I'm going for was to something simple. (Miranda, interview #3)

For Carmen, Moira, and Barbara, meeting their original expectations meant completing a multitude of ideas and prototypes. I believe that the challenge of confronting their limitations versus their expectations led these participants to start second guessing their work. Both Moira and Barbara came from a graphic art and design background and described themselves as

perfectionists. Both participants admitted to completely scrapping their initial game design and starting over again at least once, which was challenging to them.

> I think it's really interesting but I got frustrated cause like halfway through like I switched what my game entirely was going to be and then I switched the way that it was going to be. I did not have enough time to like do all the drawings and then I sped through them all the last second and it didn't look as nice as I would have liked it. (Barbara, interview #3)

> It's very frustrating. I keep on… You know from writing a story, from drawing, I keep on like going back and changing it. like I had an entire like sketch ready to get color and everything and I was just like, "Nope, try again." and I start all over and I do that like five times until I'm happy with it, even then, I'm not happy with it. (Moira, interview #3)

The participants struggled to find a balance between what they wished to create and what they were actually capable of creating. During our last interview session, I asked the participants if they felt their final product met their expectations. Surprisingly, Anna and Ellen stated that they met their expectations and felt that they surpassed what they originally hoped to create. Miranda, despite expressing a few concerns over the simplicity of her game, seemed to be quite satisfied with all that she had accomplished.

> I think mine did. Honestly at first I did not know what to do like I was just doodling on my own on a piece of paper, kind of thinking of the Flappy Bird was just out. And then the Mario Brothers I was like ok I'm going to keep it simple. So at the end I mean it came out how I wanted it to. The idea, I mean maybe the drawings could have been a little better it could have but the idea was I was happy with how the idea came across. (Miranda, interview #3)

However, three other participants did not share the same enthusiasm. Among them, there still was a lingering sense that they failed to accomplish their objective. While Barbara, Moira, and Carmen all managed to complete several components for their game interfaces, they all felt that the majority of their original designs had been left unfinished.

> Of course not, because when I started and I actually had the idea on my head of course I thought of something big or grandiose but no, no, no I mean it came out ok, I've had worst moments where I thought of something great and I got nothing it came out like crap. But this time it didn't it was like, Oh! This is ok. So I mean I'm happy with the product, it's not at all like I thought it would be. (Carmen, interview #3)

> I thought I would at least have an interface done, no I have a main menu and sketches so you know, could be worse, could have nothing. (Moira, interview #3)

> I definitely didn't meet my expectations but I always tend to overshoot what I'm capable of doing. I mean my characters and everything turned out a lot more flat than I intended. If I had six more weeks it probably still wouldn't be perfect because I just don't have those skills yet. But for what the skills that I have I think I accomplished a bit. (Barbara, interview #3)

I believe that their difficulty in trying to meet their own expectations was only half of the problem, because they seemed to lack the ability to prototype and manage their time effectively (Simons & Ertmer, 2005). It is important to emphasize that despite their limitations, they were not lazy. In fact, Moira, Barbara, and Carmen were three of the hardest workers in the group. In was not uncommon to see all three engaging in multiple activities while using two or three computer monitors simultaneously. I believe that this problem was because of their ability to

multi-task, which may have interfered with their ability to manage their time effectively. In fact, this behavior is quite similar to the findings of Hmelo-Silver and Barrows (2006), in which traditional instructionist students (Almeida, 2008) displayed sufficient understanding of the material but demonstrated difficulty integrating self-efficacy, project management, and problem solving into their work habits.

> It's still weird not having a faculty advisor around all the time especially in the Comm. Department. It's always someone looking over your shoulder and not having that, not having someone interrupt and ask me how I'm doing and help me develop things, I have to be that person for myself and I'm still learning how to do that. (Barbara, interview #2)

My observations showed that each of the participants worked with an intense sense of devotion and energy as they labored to fulfill their goals. However, they would frequently stop their current task and switch over to another only, a few minutes later, to switch to yet another task, leaving the previous two design attempts still incomplete. While the participants seemed somewhat aware of this, they seemed unable to find a solution to the problem, which indicated that constructionist design is challenging.

> I kind of made myself frustrated just because I wouldn't let myself do certain things before other things are finished and it just so happen that the first thing I needed to finish just never really got finished like the writing part, I just could never be like. Ok, that's it it's like no. I keep on adding and that's why I feel I didn't do much even though I did but I didn't think I did. (Moira, interview #3)

According to my observations, Moira and the others had difficulty in establishing an effective work flow. Rather than integrating self-efficacy to manage their progress as Hyeon Woo (2012) and Kilroy (2004) suggested, they instead seemed to be constantly shifting their

attention towards a new design. Without effective management or the confidence to self-regulate, the participants felt that they were unable to keep on task, as they would normally do.

> My only problem is I don't want to make a magical giant crazy game and I know we only have a certain amount of time to do it in so the only time I like guidelines is to restrain myself because I just want to do everything and I know I can't and I have to decide where to stop myself and I'm having a problem trying to decide where I am going to stop myself right now? (Barbara, interview #1)

However, when I looked closer at their concerns, these challenges seemed to lead back to one source, the lack of an instructor. Bers (2002) stated that one of the greatest challenges faced by instructors is finding a balance between integrating engaging learning techniques, such as social constructionism and user design, without completely removing their own interactions with the learners. However, the participants of this study were tasked with working in a social constructionist environment without an instructor present. Over the course of the study, I did observe a sudden shift in the participants' attitudes, transitioning from embracing the lack of an instructor to oversee their work to expressing a desire for increased instructor feedback and pace setting.

Barbara struggled with her concern about the lack of faculty presence. Coming from a heavy production and art design background, Barbara was accustomed to having instructors constantly present to advise and review her work. Even though she expressed enjoyment over the idea of not having a faculty member around, she could not help but worry that the she lacked the ability to manage her work (Bruckman, 1998).

> I like the idea my only problem is I don't want to make a magical giant crazy game and I know we only have a certain amount of time to do it in so the only time I like guidelines

> is to restrain myself because I just want to do everything and I know I can't and I have to decide where to stop myself and I'm having a problem trying to decide where I am going to stop myself right now. (Barbara, interview #1)

The participants continued to reinforce their confidence, stating that they were "fine without having faculty" around to oversee their work. Barbara expressed her concerns about the lack of a faculty presence, stating that she was still uncertain if the pros outweigh the cons.

> Okay. I don't necessarily think it's a good or bad thing. It's still weird not having a faculty advisor around all the time especially in the Comm. Department. It's always someone looking over your shoulder and not having that, not having someone interrupt and ask me how I'm doing and help me develop things, I have to be that person for myself and I'm still learning how to do that. (Barbara, interview #2)

The behavior of the participants seemed to coincide closely with Kuruganti's (2012) statements towards utilizing constructionist methods with adult learners. Due to the lack of an instructor, the participants expressed noticeably less concern with their overall performance and work habits. The former is quite different from the traditional instructionist classroom environments (Almeida, 2008; Harris & Shelswell, 2001) as the focus is often to teach and regulate learning. The participants instead expressed greater interest and engagement in ensuring that their designs were an accurate representation of their experiences and interests (Alimisis et al., 2007), disregarding the need to self-regulate.

When we reconvened for our last interview session, all six participants who had previously supported the "freedom to design approach," were beginning to express doubts that such an approach was practical or effective. Moira, who before this point had been one of the

strongest supporters of an "instructor free environment," now began expressing the need for an instructor, which coincided with the findings presented in Almeida's (2008) study.

> I like being told what to do sometimes. It's hard to just be like "Make a game", well what kind of game? What kind of story? Please give me some information because I will just end up generating poop. (Moira, interview #3)

For many of the participants, this project was their first major assignment without direct instructor oversight. The participants could rely only on each other or themselves for assessment and feedback. I decided to ask the participants if they would support social constructionism as an enjoyable method for a course in game design. The entire group stated that they enjoyed their experiences with social constructionism. However, if constructionism was to be adapted in another class, "especially for a grade," they would find it challenging due to the lack of frequent feedback from an instructor.

> I liked it in the classroom. One thing that I think would be cool though is to get like maybe at the end of the week or something, some type of like constructive criticism or something like, okay well, this looks like this may be you could do that and still your still getting that free mentality like you are still working freely but you're critiquing everyone's individually on something that you know that they could have improved or do something better. (Miranda, interview #3)

> I appreciated the freedom but like when someone is telling you how much you want to achieve at the end of 6 weeks. Then I know how much I am expected to create and how much I am capable of achieving. I set goals that were way too much for what the amount of time that I have and the skills that I have. And it would have been nice to have a smidge of direction. (Barbara, interview #3)

Miranda, Carmen, Barbara, and Anna suggested that rather than excluding instructor oversight, classrooms should utilize instructors by allowing them to serve as facilitators. The students would still maintain the freedom to create whatever game they wished but receiving feedback and troubleshooting from the instructor whenever necessary. Carmen, Moira, and Barbara added that an instructor could also aid students by serving as a regulator to keep the learners on task with their project.

> Having some check-ins like once a week inside or even outside of class. Having the opportunity to interact with the professor and help push yourself in a direction particularly if you are like me and I didn't have any experience in this before, having a little bit of a push in a particular better direction might have been a little bit helpful so it was a course, I think that would be incredibly helpful. (Barbara, interview #3)

> Structure freedom would be good. Like maybe if we had one week or two weeks where we were just solely working on the storyline then maybe we would be able to push out exactly what we want and everyone will be at the same point with the storyline and then after that we could dedicate a certain amount of week to the rudimentary design and then after that we can go into putting it into something. (Carmen, interview #3)

Their suggestions almost perfectly coincided with Hung's (2008) recommendations for instructors integrating social constructionist methods into their classrooms. Hung argues that instructors should never completely abandon their students on a project. Instead, they should shift their role from an instructor to one of a facilitator (Hung et al., 2008). By taking this stance, instructors would allow learners to maintain their sense of independence while still providing a system of support and collaboration whenever necessary (Hyeon Woo, 2012). In addition, the

instructor could also encourage interaction and collaboration among the participants (Barrows & Tamblyn, 1996) while remaining independent from the process.

Contrary to Barrows and Tamblyn's (1996) and Hung's (2008) statements, I observed very little interaction or group reflection among the participants throughout the six-week period. It is possible that they valued the experiences and opinions of an instructor over those of their fellow participants. Both Almeida (2008) and Othman (2013) stated that because traditional instructionist students are so accustomed to receiving information and feedback from their instructors, it is much harder from them to rely on designing artifacts themselves. It is also possible that they may have felt more isolated due to the project's focus on individual game designs rather than a single group project (Bruckman, 1998). For some of the participants, this lack of interaction could be due to issues of self-confidence, such as those described by Miranda.

> Maybe like once a week a professor could. The professor could do the critiquing and then have kind of like – I guess I won't say it would be mandatory for the group too but it would still be fun to interact with the group like I wish I would have interacted with you guys a little more but I was kind of like well mine sucks so I don't want to ask you for advice but I guess knowing this now, I would have taken – I would take advantage of that cause you guys all have cool ideas so it would be cool to see what other – what other people would say about your project. (Miranda, interview #3)

While it is quite evident that each of the participants experienced a variety of challenges throughout the creation of the game interfaces, they were still able to overcome these challenges by demonstrating a surprising level of self-awareness and motivation to find ways to complete the project.

Interaction Might Not Be a Vital Component of Social Constructionism

Constructionism is a learning method that focuses on allowing individual learners to create their own knowledge base by constructing artifacts (Ackerman, 2001). It allows the learner to make a personal connection to the information presented in class, generating new levels of knowledge that have a greater connection to that individual (Bednar et al., 1992; Papert & Harel, 1991). Social constructionism follows the same line of thinking; however, it moves away from focusing on each individual learner to working to create a shared knowledge base among a group of learners (Beldarrian, 2006; Alimisis, 2007).

My observations began during the second week of the project, the participants having already met for two previous work sessions. For the first five minutes, the group began talking with one another while they waited for their computer stations to start up. Anna, Barbara, and Moira were all chatting about a variety of different subjects; however, none of them were project related. After about five minutes, all of the conversations and interactions completely subsided. Each of the participants turned their attention to their computer stations and began to work. At first, I was not really surprised by their behavior. After all, they all had prior production experience and seemed to be closely following Papert's (1991) theories on learner engagement within social constructionist settings. What came as a surprise was their lack of interpersonal communication. Contrary to what Bruckman (1998) and Jonassen (1999) stated, social constructionism did not appear to be acting as a "catalyst for social activity." Instead, every participant, except Miranda, put on a pair of headphones and began to listen to music while they silently worked on their interface. Perhaps this phenomenon happened due to the contemporary heavy use of computers in our society (Almeida, 2014).

I decided to ask the group to describe their experiences working in the same environment together (Kafai, 2006) as a means to get them speaking. Miranda was the first to speak up stating that they were all content working "solo." The rest of the group nodded in silent agreement. Barbara and Moira, however, added that interacting with each other was not essential to their current work on the project.

> I think that one of the reasons we're solo and it might just be me and myself but we're in the developing stages right now and I think that once we get like some good ideas down and really get into the developing more, we might – I mean after I develop enough, I might ask people what they think of my game and how it looks and what could effectively make it better to play and everything like that but yeah –I've just been – now that I'm a designer like I don't want people bothering me. I just want to get everything that I have in my head down right now. (Barbara, interview #1)

> Yeah, that's at least for me, like I have an idea and once it's like completely like flushed out as much as I can get, I'm going to ask people is this offensive? Should I not do this? And then we'll go from there. [But so far you're just – you're kind of working on the template before you show it.] Yes. (Moira, interview #1)

Based on their responses, the participants seemed to prefer isolation over interaction, at least until their initial concepts and designs were partly finished. While Bruckman (1998) did observe a few of his own participants preferring to work individually, the majority still preferred social interaction to working alone. It could be possible that because the participants of this study were older and more experienced with production-based work than the traditional K-12 populations of previous studies (Beldarrain, 2006; Cannings & Stagger, 2003; Bruckman, 1998), the participants of this study felt more confident in their ability to work alone.

In addition, to their preference to work solo, the majority of the participants increased their isolation even further by using headphones to listen to music. For Ellen and Carmen, this seemed to be a top priority because getting their music ready was the first thing they would do at the start of each session, while the remaining participants would generally engage in a few minutes of brief conversation. The participants seldom took any breaks, due to listening to their music for the entirety of each work session. This pattern repeated itself each session throughout the entire six-week period. By the third interview session, I decided to ask the participants if they believed music to be an important component of their work habits. Each of the participants stated that it was important. For Ellen and Barbara, it was essential. Even Miranda, who was the only participant that did not listen to music while she worked, admitted that she did not listen to music because she did not have access to a pair of headphones that fit.

> It is like literally essential for me. If I don't listen to music I won't accomplish anything. (Ellen, interview #3)

> I have to listen to music. I had to like put myself in that zone. I think I just was trained to do that through all my art classes. We always listen to music, once the music comes on we shut up and we just do our work so that helps me focus a lot more definitely. (Barbara, interview #3)

This pattern of behavior went largely unchanged until four weeks into the study. After over an hour of work, Anna let out a sigh and expressed concern that the cat character she had been working on did not look quite right. While it appeared that she was only talking aloud, she managed to get Barbara's attention. Almost immediately Barbara moved over to Anna's computer station to look over her design. The pair quickly became engrossed in conversation as Barbara began making suggestions on how Anna could improve the design of her character.

Shortly after, Barbara invited Anna over to her computer station to help her search for different examples of cat art that could possibly aid her. Finally, it appeared that the participants were engaging in meaningful interaction (Bruckman, 1998) as Barbara shared her prior art and design experience with Anna to create a stronger character design (Alimisis et al., 2007). However, this interaction was very short lived. After only ten minutes or so of discussing their game designs, the pair quickly became distracted and began searching for a wide variety of seemingly random content for the next twenty minutes.

The only other notable participant interaction occurred during the last day of the study. Once again, the participants started the session with few minutes of casual, non-project related conversation. However, when the other participants began to work, Anna and Barbara continued to chat. From what I observed, their conversation had little relevance to their projects. Instead, they decided to focus on a random assortment of topics. At one point the pair began to watch a series of SpongeBob SquarePants clips on YouTube. This activity lasted roughly twenty-two minutes before the pair finally returned to their individual computer stations and began work on their projects. I believe that this was used mostly to relax and allow both Barbara and Anna the opportunity to take their minds of their work, as Barbara perfectly described it.

> I was literally at an odd point of my game too. I tended to interact with people when especially like you guys when I got to a point where I hit like a wall and like needed to step away from the game so I bother other people for a little bit and be really annoying and then I would be like okay get back to my game and get back to work and everything like that like I needed little breaks sometimes because I was getting kind of frustrated at one point but we did talk a little Alex's game when she was trying to decide some things

> so we talked a little bit about the games but it was were not about my game cause I knew what I wanted to do. I didn't want anyone touching my game. (Barbara, interview #3)

At the conclusion of the study, I asked the participants to describe once again their experiences working in an environment together (Kafai, 2006). I wanted to know if the participants' perceptions on social interaction had changed or if they were more inclined to interact with one another whenever I was not present. The majority of the participants described that their interactions with each other were minimal and they did not seem to consider interaction as a necessary part of their design experience. In fact, their statements seemed to coincide with my previous observations that the majority of their interactions were not related to their projects at all.

> I think when you are focused on like building your game or you know exactly what you want to do or when you are working there is no time for interactions just like okay, let's just get this done. (Carmen, interview #3)

It should be noted, however, that Moira and Anna stated that their interactions increased slightly whenever I was not present, but the majority of these conversations still remained unrelated to their project.

> Like when you weren't there. (laughter from the rest of the group)….. [Which time?]…. I think it was not about the game if I remember. It was kind of like random stuff and sometimes you may talk about the game but it wasn't like I don't think I talked about my game at all because I didn't feel like it was ready to be talked about but I overheard some people talking about their games but I'm not saying who, that because I can't remember. (Moira, interview #3)

> Yeah, I feel like it was like one of the days out of the week, like one day when the just like sitting there like doing our work and then like the other day we would start like talking. (Anna, interview #3)

Based on these statements, it would appear that the experiences of the participants strongly conflicted with much of the prior research done on social constructionism (Bruckman, 1998; Alimisis, 2007). Rather than view their task as an opportunity to work collaboratively, as suggested by Bruckman (1998) the participants instead, chose to work almost exclusively in isolation, stating that they felt just fine working "solo."

In the final chapter, this dissertation will explore the impact of these themes and how they could potentially shape future research for the adoption of social constructionist methods within both the classroom and the industry.

CHAPTER 5

CONCLUSSION AND RECOMMENDATIONS

This research study explored the experiences of female undergraduates majoring in communications media as they designed and constructed their own 2D game interfaces. The participants were asked to construct a game interface of their own choosing (Papert & Harel, 1991), while working in a social constructionist environment without any prior instruction (Bruckman, 1998). The participants had to rely on their own knowledge and experiences of the group in order to complete the assignment (Reigeluth, 1999). Phenomenology was used to answer the following questions. What is it like for female students to design their own 2D game interfaces under the lens of constructionism? What evidence is there that the inclusion of a female population will hinder or support the current trend of integrating games as a method to test social constructionism? How do the processes of constructionism in the cases explored diverge or support the use of game design as a vehicle for constructionism in the classroom and in the industry?

In this chapter, I summarize the findings of my research study as well as the study's limitations. Next, I relate the results of this study to existing theories, submit my recommendations for further research, and finish with some closing remarks.

Summary of the Findings

Over the course of this study, five themes emerged from the data. These themes were (a) social constructionism brings equal gender representation awareness, (b) social constructionism generates goal identification and identity awareness, (c) social constructionism is empowering, (d) social constructionism is challenging, and (e) interaction is not an essential component of social constructionism.

Kafai (2007), Besisser (2006), and Brar (2012) have stated that there is a lack of equal representation between male and female players within the video game industry. The statements and observations gathered in this study support their arguments. The participants reported that they were aware of the lack of equal female representation within the marketing of games. In addition, they expressed frustration at the common industry practice of using overly sexualized female video game characters. Coinciding with the statements made by Brar (2012) and Yao, Mahood, and Lidz (2010), the participants believed the best solution to these problems would be to increase the presence of female workers within the video game industry by increasing female game designer representation.

Social constructionism has been considered by Papert (1991) as an effective means of integrating a learner's past experiences, while allowing the freedom to construct artifacts that are personally meaningful to the learner. By providing the learners the opportunity to work in a social constructionist environment without the aid of an instructor, the learners reported engaging in self-identification in order to identify properly the skills and knowledge needed to complete their designs. Overall, the participants showed an accurate understanding of their strengths and weaknesses, as well as how those traits directly influenced their performance on the project, which strongly coincides with the statements made by Ackermann (2001). They also reported that while social constructionism was challenging, it enabled them to gain a better understanding of their skills and abilities, and how they might apply this new knowledge in the future, just as Papert and Harel (1991) stated.

Through social constructionism, the participants had the opportunity to integrate the ideas and experiences that they believed to be personally significant (Papert, 1991; Alimisis, 2007), leading to a sense of empowerment. The participants repeatedly reported a sense of liberty, a

feeling that they were now able to create any game they liked (Kafai, 2006; Almeida, 2008). These feelings were possible because there was no supervision by an instructor. In fact, several of the participants stated that they felt truly empowered which led them not to worry about someone constantly looking over their shoulders as they worked.

Each of the five participants reported facing a series of challenges while designing their game interface. Two of the most common challenges reported were meeting project expectations and effectively managing their time. However, based on the statements made by the participants, the source of these problems seemed to be the lack of instruction they received. Without an instructor present, several of the participants stated that it was difficult to manage their time and work habits effectively, which was reported as an issue by both Almeida (2008) and Carr-Chellman (2007). In addition, several participants stated that they were unaccustomed to working in an environment where they did not receive regular instructor feedback and that it was difficult to rely only on themselves (Harris & Shelswell, 2001), which resulted in design uncertainties.

Contrary to the theoretical accounts made by Bruckman (1998) and Holbert (2010) who stated that interaction was a vital component between their participants, the participants of this reported that social interaction was not an essential part of their design process. The participants seldom collaborated on their projects, the majority of their interactions being unrelated either to their work or via interpersonal communication. They preferred to work alone, or at least until they felt their projects were worth sharing. In addition, they stated that they valued the feedback and assistance of an instructor over their fellow participants, which reinforces Harris and Shelswell's (2001) theory on the importance of maintaining an active instructor presence in a social constructionist environment.

While the participants expressed some difficulty in creating their interfaces, they reported overall that they enjoyed the experience. They expressed a sense of appreciation and empowerment that came from their ability to design their own game interface. In summary, I feel confident asserting that the participants found social constructionism to be an engaging and effective means of learning.

Answering the Research Questions

The purpose of this study was to address the following questions. 1) What are the lived experiences of female students as they design their own 2D game interfaces under the lens of constructionism? 2) What evidence is there that the inclusion of a female population will hinder or support the current trend of integrating game as a method to test social constructionism? 3) How do the processes of constructionism in the cases explored diverge or support the use of game design as a vehicle for constructionism in the classroom and in the industry?

1. The participants' experiences of constructing their own 2D game interfaces were empowering, liberating, entertaining, and allowed them to utilize self-efficacy and identity awareness in their work. While the participants were provided a social constructionist environment to work with, the majority of the participants reported that they preferred to work "solo" and seldom collaborated on their designs. In addition, the participants stated that their challenges were largely due to the lack of instructor presence to facilitate interaction and feedback.
2. The participants reported little difficulty in integrating game design methodologies into their classroom experiences, which may largely be due to their prior experience with video games. Each of the participants reported playing video games on a regular basis, and frequently cited current video game titles as their inspirations for their own designs.

Through this process the participants supported the theoretical accounts made by Gee (2007) and Rosas (2003), who stated that game design would allow learners to integrate into their designs the stories, experiences and knowledge that they considered personally meaningful (Almeida, 2008). The only challenge reported by the participants was that their lack of prior game design experience hindered their ability to construct a game that met their initial goals and expectations.

3. For the participants in this study, the use of game design as a vehicle for constructionism supported the arguments made by Kafai (2006) and Papert (2001). They demonstrated excitement with their ability to take ownership over their work and expressed genuine interest in taking additional game design courses in the future (Stager, 2005). However, the participants diverged from the theoretical accounts of social constructionism (Bruckman, 1998), expressing that social interaction was not vital to their work habits. For them, receiving consistent feedback and assistance from an instructor was more meaningful than relying on each other. The participants were also aware of the lack of equal representation between the genders within the video game industry (Kafai, 2007; Besisser, 2006; Brar, 2012) and expressed interest in designing games that would combat the issue. Their statements coincided with Brar's (2012) and Kafai's (2007) arguments that game design could serve as a gatekeeping tool that would potentially introduce more females into the industry itself.

Theory Implications and Practice

The purpose of this research study was to contribute to the understanding of constructionist methodologies, more specifically the lived experiences of six female game designers as a vehicle for advancing social constructionism. This study also sought to explore the

inconsistencies between the ratios of female video game players to female game designers (Kafai, 2007).

Constructivism, social constructionism, and user design are important and demand further research. Their purpose has been to empower learners to have more direct control over their own learning (Papert & Harel, 1991). My study advanced social constructionism and game design theory by providing a detailed description of the lived experiences of the participants as they designed a 2D game interface in an instructor-free classroom environment. The participants demonstrated an eagerness to work in an environment devoid of formal instruction, frequently expressing a feeling of liberation from their typical classroom restrictions. Just as Papert (1991) theorized, by utilizing social constructionism, the participants were free to create artifacts that had a deeper personal connection to each individual. They integrated their own cultural backgrounds, personal experiences, knowledge, and skills into their game designs (Reigeluth, 1999). Soon afterwards they began engaging in regular self-reflection as they constantly compared their current skills and abilities to those required by the study. Through self-evaluation, the majority of the participants were able to identify their strengths and weakness and establish a work plan that would best complement them (Ackermann, 2001). By utilizing programs that were familiar to each individual, I would argue, the participants demonstrated self-efficacy as they constructed artifacts that worked off their talents and interests.

Despite their reports of liberation, empowerment, and overall enjoyment, the participants still experienced difficulties as they worked. The lack of instructor presence, common in most instructionist-based classrooms, greatly affected their self-confidence and ability to self-manage. Without an instructor present with whom to collaborate and from whom to solicit feedback, the participants often second-guessed themselves. I believe this is why Hung (2008) and Hmelo-

Silver and Barrows (2006) theorized it was so important for the instructor to maintain an active presence in a social constructionist environment. However, unlike the previous study conducted by Hmelo-Silver and Barrows (2006), the participants of this study seldom collaborated on their work throughout the six-week period.

Compared to Almeida's (2008) study, my participants reacted quite differently from the expected norms of social constructionist classrooms. Rather than embracing peer participation (Almeida, 2008) and collaboration (Barrows, 1986), the participants chose isolation often interacting only through brief off-topic conversations at the start of work sessions. I would argue that without having a shared group project, it is likely that participants would work alone (Bruckman, 1998). Indeed, the former may have been further explained by the isolating nature of mobile and online technologies, which allowed the users to refer to the Internet for answers rather than to each other (Almeida, 2014). In addition, without an instructor present to facilitate interaction, participants had little incentive or motivation to collaborate amongst each other (Hung et al., 2008).

Despite the challenges faced by the participants, they reported feeling satisfied with their overall designs and were empowered to create incorporate their personal experiences and backgrounds into their final interface design (Papert, 1991). In fact, several of the participants stated that because of their experiences on this project, they now viewed game design as a potential career option. I would argue that these results help to support both Stager's (2005) and Kafai's (1996) claims that game design, while engaging and empowering, also serves as a gatekeeping tool to introduce new areas of learning to students. It is my hope that educators will recognize the potential of game design as a tool for engaging students while still providing them

the opportunity to expand their understanding of new technologies, potential fields of study, and satisfying careers (Baytak & Land, 2011; Kafai, 1996).

Study Reflections

I entered this study with a bias towards the potential use of social constructionism, hoping that it would provide a compelling case of how it can be used to facilitate socially interactive and engaging learning among students (Papert & Harel, 1991). However, I came to realize over the course of this study that social constructionism can be difficult to implement fully, and is not totally a social activity. The participants were even placed in a work environment that encouraged interaction and collaboration. However, the participants simply stated that they did not see a pressing need to work collaboratively to complete their projects. It seemed that as long as they had their music and access to the Internet, the participants were just fine working in self-imposed isolation. Perhaps if social constructionism is going to be adapted in classrooms some changes will have to be made to insure that students are encourage to interact more.

If I were asked to design an undergraduate game design course using social constructionism, I would be cautious to implement the variable applied in this research study. While providing the participants with the opportunity to choose whatever software they wished allowed for greater empowerment (Almeida, 2008), it also furthered the isolation between them. Without a unified set of objectives and tools, student interaction and collaboration became less likely due to the lack of shared experiences between their individual designs (Bruckman, 1998). In addition, having a set of objectives and tools would decrease student stress by providing a framework that would be more easily monitored and evaluated, while still allowing the students to design a game that they valued.

I also found that while learners appreciate the freedom that comes from the instructor taking a hands-off approach that does not mean the instructor should be removed completely from a social constructionist experience. The participants in this study were all instructed using the current education paradigm. They were used to having an instructor present whose responsibilities included supervising student progress and providing regular feedback (Harris & Shelswell, 2001). While initially they expressed feelings of liberation, these liberation feelings soon began to fade as the participants expressed a desire to return to a more familiar learning environment (Bers, 2002). After listening to their feedback, it became clear that the participants' statements closely followed Hung's (2008) recommendations for instructors to serve as facilitators when working in social constructionist environments. As facilitators, their role shifts to supportive tasks including providing assistance, troubleshooting, encouraging interaction among the participants, assisting in time and task management, and providing feedback as needed (Hyeon Woo, 2012). This method increases the learners' participation and sense of empowerment because the instructor is now acting as a resource (Barrows, 1986).

Kafai (2007) stated that females have an active presence within the realm of video game design (Gee, 2007). They are just as active as consumers and contributors to the gaming culture as their male counterparts (Kafai, 2008). This study's participants did not require any additional instruction or special consideration because of their gender; instead, they demonstrated a strong sense of engagement and empowerment as they took charge of their project, designing their own game interface without any formal game training.

Limitations of the Study

This study was limited by time and expertise. While the study took place over a six-week period, the participants worked only a total of 18 hours on their project. Despite their

extraordinary accomplishments in producing a completed game interface in such a short period of time, the results were barely up to par with only half of the participants managing to complete their interface design on time. Game design is a complex and labor-intensive process, with time a constant challenge. It should be noted that in addition to the subjects' work on the project, they were also full-time students, and several of them held part time jobs. Perhaps, if the participants had a full year to design their interfaces, they might have had the opportunity to further explore new methods of design and fulfill their initial project expectations. In order to strengthen the quality of this study, I followed Van Manen's (2003) recommendations and engaged in frequent reflection as I described the lived experiences of the participants. However, my ability to provide an accurate representation of these experiences, in relation to the expectations of a more experienced phenomenologist, is unclear. I strived to ensure that my reflections and writings were as accurate as possible by engaging in member checks, triangulation, the use of thick descriptions and clarifying my own biases. However, this data only reflects a small portion of the female student population lived experiences in the study's context of a mid-sized university.

Future Questions and Possible Research Studies

According to the format of this study, the participants each designed their own individual 2D game interface. However, the participants remained isolated and seldom interacted throughout the six-week period despite working in a social constructionist environment. Further research could follow the same procedures as investigated in this study focusing on collective rather than individualistic goals (Bruckman, 1998). It may also be worth exploring its impact on learner behavior in game design, as well as instructor facilitation on progress within the constructionist classroom (Hung et. al., 2008; Hyeon Woo, 2012).

A potential future study could include a more representative female student population, perhaps with a population of females 18 years old and older. Future research could also be

expanded by including graduate adult learners, as females are now poised to be equal participants within the video game industry and culture (Terlecki et al., 2011). As more female designers begin entering the industry it is essential to explore further their experiences as game designers. Both Kafai (2007) and the participants studied reported that female designers and players repeatedly face harassment and discrimination based solely on their gender. Perhaps a mini- ethnographic study focused on gender identity in virtual worlds should be conducted.

Final Remarks

Based on the participant's statements and my own observations, I was forced to concede that my original bias towards social constructionism was mistaken. During the course of this research study, I observed minimal interaction among the participants, with the participants themselves reporting that interaction and collaboration was not a vital component for their work. The results of this research strongly contradict the prior research of Bruckman (1998) and Alimisis (2007), who argued that social constructionism served as an effective tool for generating engaging experiences and interactions among the participants.

Perhaps for social constructionism to be more effective with adult learners, instructors will need to rely more on shared group projects rather than separate individual projects, such as the one assigned during this study. Without a unifying shared activity to serve as the "catalyst for social interaction," the participants had little incentive to work together (Bruckman, 1998; Beldarrian, 2006; Alimisis, 2007; and Freire, 1996). This could have been further enhanced by the sense of freedom the participants described feeling due to the absence of an instructor while they worked (Harris & Shelswell, 2001). Without an instructor to serve as a facilitator, the participants of this study could have felt there was little need to interact or collaborate on their designs. In fact, the participants expressed a much greater interest in receiving feedback from

their instructor than from their fellow participants, which closely coincides with the observations made by (Almeida, 2008; Othman & Ahamad Shah, 2013).

I also found the isolating effects of technology to be quite surprising. There had been very little information to support the argument that technology would isolate the learners from each other rather than to serve as a support network (Holbert et al., 2010; Roberston & Howells, 2008; Kafai, 2007). However, this discrepancy could be due to several factors. One such factor is that unlike traditional classroom settings, the participants in this study were permitted to listen to music while they worked. While I am inclined to believe this could be a major contributing factor, I have previously observed numerous production classes that allowed their students to listen to music while they worked, all the while maintaining a certain level of interaction. Another cause could be that the increased saturation of mobile technology has begun to change the social patterns of young adults in our culture (Almeida, 2014). Rather than rely on instructors to provide information, learners can now easily access online search engines such as Siri or Google to find an answer to almost any question they might have. If so, this could make render interaction less necessary as the participants would have easy access to any additional information that they might need. If educational reform's advance is to continue, more attention must be given to exploring the impact that technology has not only within our educational system but also on the individual learners themselves (Papert, 1991).

References

Ackermann, E. (2001). Piaget's constructivism, Papert's constructionism: What's the difference? *Future of Learning Group Publication, 5*(3), 438.

Alimisis, D., Moro, M., Arlegui, J., Pina, A., Frangou, S., & Papanikolaou, K. (2007). Robotics & Constructivism in Education: the TERECoP project. In Ivan Kalas (Ed.), *EuroLogo 2007, 40 Years of Influence on Education, Proceedings of the 11th European Logo Conference*, 19 - 24 August 2007, Comenius University, Bratislava, Slovakia.

Almeida, L. C. (2008). *The phenomenological exploration of user-design in gifted rural high school students when designing their own game* (Doctoral dissertation). Retrieved from https://etda.libraries.psu.edu/paper/8442/

Almedia, L. C. (2012). *Writing the phenomenological qualitative dissertation step-by-step*. Boston, MA: Pearson.

Banathy, B. (1991). *Systems design of education*. Englewood Cliffs, NJ: Educational Technology.

Baptiste, I. (2005). *Research quality equals optimizing investigator's talent and resources*. Unpublished manuscript, Department of Psychology, Penn State University, State College, Pennsylvania.

Barrows, H. S. (1986). A taxonomy of problem-based learning methods. *Medical Education, 20*(6), 481-486.

Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education* (Vol. 1). New York, NY: Springer.

Baytak, A., & Land, S. (2011). An investigation of the artifacts and process of constructing computers games about environmental science in a fifth grade classroom. *Educational Technology Research & Development, 59*(6), 765-782.

Bednar, A. K., Cunningham, D., Duffy, T. M., & Perry, J. D. (1992). Theory into practice: How do we link? In T. M. Duffy, & D. H. Jonassen (Eds.), *Constructivism and the Technology of Instruction: A Conversation*, (pp. 17-34). Hillsdale, NJ: Lawrence Erlbaum.

Beisser, S. R. (2006). An examination of gender differences in elementary constructionist classrooms using Lego/Logo instruction. *Computers in the Schools*, *22*(3-4), 7-19.

Beldarrain, Y. (2006). Distance education trends: Integrating new technologies to foster student interaction and collaboration. *Distance Education, 27*(2), 139-153.

Bers, M. U., Ponte, I., Juelich, K., Viera, A., & Sshenker, J. (2002). Teachers as designers: Integrating robotics in early childhood education. *Information Technology in Childhood Education, 123*, 145.

Bianco, M. B., & Carr-Chellman, A. A. (2007). Exploring qualitative methodologies in online learning environments. *Quarterly Review of Distance Education, 3*(3) 299-318.

Bogdan, R., & Biklen, S. (1992). *Qualitative research for education* (2nd ed.). Boston, MA: Allyn and Bacon.

Brar, K. (2012). "Level up--A Case for Female Gamers." *Reconstruction: Studies In Contemporary Culture, 12*(2). *Humanities Source*, Retrieved from eds.b.ebscohost.com/ehost/

Bruckman, A. (1998). Community support for constructionist learning. *Computer Supported Cooperative Work (CSCW), 7*(1), 47-86.

Bruckman, A., & Resnick, M. (1995). The MediaMOO project constructionism and professional community. *Convergence: The International Journal of Research Into New Media Technologies, 1*(1), 94-109.

Buddenbaum, J., & Novak, K. (2001). *Applied communication research*. Ames, Iowa State University Press.

Cannings, T., & Stager, G. (2003, January). *Online constructionism and the future of teacher education.* Paper presented at the ICT and the Teacher of the Future-Selected Papers from the International Federation for Information Processing Working Groups 3.1 and 3.3 Working Conference, Melbourne, Australia.

Carr, A. A. (1996). Distinguishing systemic from systematic. *Tech Trends, 41*(1), 16-20.

Carr, D. (2005). Contexts, gaming pleasures, and gendered preferences. *Simulation & Gaming, 36*(4), 464-482.

Carr-Chellman, A. A. (2007). *User design*. Mahwah, NJ: Lawrence Erlbaum.

Carr-Chellman, A. A., & Almeida, L. C. (2006). User design for systemic change. *TechTrends, 50*(2), 44-45.

Charles, D., Kerr, A., McNeill, M., McAlister, M., Black, M., Kcklich, J., & Stringer, K. (2005). Player-centered game design: Player modelling and adaptive digital games. *Proceedings of the Digital Games Research Conference: Changing ViewsWorld in Play:* Vol. 285. British Columbia.

Charsky, D. (2010). From edutainment to serious games: A change in the use of game characteristics. *Games and Culture, 5*(2), 177-198.

Crawford, G. (2005). Digital gaming, sport and gender. *Leisure Studies, 24*(3), 259-270.

Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.

Creswell, J. W. (2007). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage.

Creswell, J. W., Hanson, W. E., Plano, V. L. C., & Morales, A. (2007). Qualitative research designs selection and implementation. *The Counseling Psychologist, 35*(2), 236-264.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. *Theory Into Practice, 39*(3), 124-130.

Denner, J., Bean, S., & Werner, L. (2005, June). *Girls creating games: Challenging existing assumptions about game content*. Paper presented at the DIRGRA 2005 Conference, Vancouver, British Columbia, Canada.

Denzin, N. K. (1970). *The research act: A theoretical introduction to sociological methods*. Piscataway, NJ: Transaction.

Denzin, N. K. (1989). *Interpretive biography* (Vol. 17). Newbury Park, CA: Sage.

Denzin, N. K., Lincoln, Y. S., & Giardina, M. D. (2006). Disciplining qualitative research. *International Journal of Qualitative Studies in Education, 19*(6), 769-782.

Dickey, M. D. (2006). Girl gamers: The controversy of girl games and the relevance of female-oriented game design for instructional design. *British Journal of Educational Technology, 37*(5), 785-793.

Dondlinger, M. J. (2007). Educational video game design: A review of the literature. *Journal of Applied Educational Technology, 4*(1), 21-31.

Dowling, M., & Cooney, A. (2012). Research approaches related to phenomenology: Negotiating a complex landscape. *Nurse Researcher, 20*(2), 21-27.

Egenfeldt-Nielsen, S. (2006). Overview of research on the educational use of video games. *Digital Kompetanse*, *1*(3), 184-213.

Entertainment Software Association (2011, May). *Industry Facts.* Retrieved from http://www.theesa.com/facts/index.asp

Ferencz-Flatz, C. (2011). Introduction: Concepts of tradition in phenomenology. *Studia Phaenomenologica*, *11* 11-14.

Flanagan, M. (2005). Troubling games for girls': Notes from the edge of game design. *Unpublished proceedings of Digital Games Research Association*. (DIGRA), Vancouver, Canada.

Flood, A. (2010). Understanding phenomenology. *Nurse Researcher, 17*(2), 7-15.

Floridi, L. (2011). A defense of constructionism: Philosophy as conceptual engineering. *Metaphilosophy*, *42*(3), 282-304.

Freire, P. (1968). *Pedagogia do oprimido* [Pedagogy of the oppressed]. Rio de Janeiro, Editora Paz e Terra.

Gallagher, S., & Francesconi, D. (2012). Teaching phenomenology to qualitative researchers, cognitive scientists, and phenomenologists. *Indo-Pacific Journal of Phenomenology, 12* 1-10.

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

Gee, J. P. (2007) *Good video games + good learning*. New York, NY: Peter Lang.

Good, J., & Robertson, J. (2006). Learning and motivational affordances in narrative-based game authoring. *Proceedings of the 4th International Conference for Narrative and Interactive Learning Environments (NILE)* (pp. 37-51) Edinburgh, Scotland.

Graneheim, U., & Lundman, B. (2003). Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, 24, 105-112.

Halverson, R. (2005). What can K-12 school leaders learn from video games and gaming? *Innovate: Journal of Online Education, 1*(6).

Harris, S. R., & Shelswell, N. (2001). Building bridges across the digital divide: Supporting the development of technological fluency in Adult Basic Education learners. In *Proceedings of the FACE Annual Conference.* (pp. 42-51) Worcester, England.

Hartmann, T., & Klimmt, C. (2006). Gender and computer games: Exploring females' dislikes. *Journal of Computer-Mediated Communication, 11*(4), 910-931.

Hayes, E. (2005). Women, video gaming and learning: Beyond stereotypes. *TechTrends, 49*(5), 23-28.

Hmelo-Silver, C. E., & Barrows, H. S. (2006). Goals and strategies of a problem-based learning facilitator. *Interdisciplinary Journal of Problem-Based Learning, 1*(1), 4.

Holbert, N., Penney, L., & Wilensky, U. (2010). Bringing constructionism to action game-play. *Proceedings of Constructionism* 2010 Conference. Paris, France.

Hong, J., Fadjo, C., Chang, C. H., Geist, E., & Black, J. (2010, June). Urban culture and constructing video games. Paper presented at Ed-Media World Conference on Educational Multimedia, Hypermedia and Telecommunications. Toronto, Canada.

Hung, W., Jonassen, D. H., & Liu, R. (2008). Problem-based learning. *Handbook of Research on Educational Communications and Technology, 3,* 485-506.

Husserl, E. G. (1970). *The crisis of European sciences and transcendental phenomenology: An introduction to phenomenological philosophy*. Evanston, IL: Northwestern University Press.

Hyeon Woo, L. (2012). User-design approach in problem development and its effects on authenticity, performance, and satisfaction in problem-based learning. *Asia-Pacific Education Researcher*, *21*(3), 526-534.

Jenlink, P. M., Reigeluth, C. M., Carr, A. A., & Nelson, L. M. (1998). Guidelines for facilitating systemic change in school districts. *Systems Research and Behavioral Science*, *15*(3), 217–233.

Jonassen, D., Davidson, M., Collins, M., Campbell, J., & Haag, B. B. (1995). Constructivism and computer-mediated communication in distance education. *American Journal of Distance Education*, *9*(2), 7-26.

Kafai, Y. B. (1994). *Minds in play: Computer game design as a context for children's learning.* Mahwah, NJ: Lawrence Erlbaum.

Kafai, Y. B. (1996). Software by kids for kids. *Communications of the ACM, 39,* 38-39.

Kafai, Y. B. (2006). Playing and making games for learning. *Games and Culture, 1*(1), 36-40.

Kafai, Y. B. (2008). Synthetic play: Girls and boys gaming together and apart in teen virtual worlds. *Beyond Barbie and Mortal Kombat: New Perspectives on Gender and Computer Games,* 60-85.

Kafai, Y. B., & Resnick, M. (Eds.). (1996). *Constructionism in practice: Designing, thinking, and learning in a digital world*. New York, NY: Routledge.

Kilroy, D. (2004). Problem-based learning. *Emergency Medicine Journal: EMJ*, *21*(4), 411.

Kitzinger, J. (1994). The methodology of focus groups: The importance of interaction between research participants. *Sociology of Health & Illness*, *16*(1), 103-121.

Kitzinger, J. (1995). Qualitative research: Introducing focus groups. *BMJ*, *311*(7000), 299-302.

Kuruganti, U., Needham, T., & Zundel, P. (2012). Patterns and rates of learning in two problem-based learning courses using outcome based assessment and elaboration theory. *Canadian Journal for the Scholarship of Teaching and Learning*, *3*(1).

Lee, J., Luchini, K., Michael, B., Norris, C., Solloway, E. (2004, April) *More than just fun and games: Assessing the value of educational video games in the classroom.* Paper presented at the CHI '04 extended abstracts on Human Factors in Computing Systems, Vienna, Austria.

Lenhart, A., Kahne, J., Middaugh, E., Macgill, A. R., Evans, C., & Vitak, J. (2008). Teens, video games, and civics: Teens. *Pew Internet & American Life Project*, 76.

Lincoln, Y. S. (1995, April). *Emerging criteria for quality in qualitative and interpretive research.* Paper presented at the Annual Meeting, American Educational Research Association, San Francisco.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.

Lucas, K., & Sherry, J. L. (2004). Sex differences in video game play: A communication-based explanation. *Communication Research*, *31*(5), 499-523.

Lund, H. H. (1998). Robot soccer in education. *Advanced Robotics*, *13*(8), 737-752.

Mapp, T. (2008). Understanding phenomenology: The lived experience. *British Journal of Midwifery*, *16*(5), 308-311.

Merriam, S. B. (1998). *Qualitative research and case study: Applications in education, revised and expanded from case study research in education.* San Francisco, CA: Jossey-Bass.

Moreno-Ger, P., Burgos, D., Martínez-Ortiz, I., Sierra, J. L., & Fernández-Manjón, B. (2008). Educational game design for online education. *Computers in Human Behavior*, *24*(6), 2530-2540.

Moshirnia, A. (2007). The educational potential of modified video games. *Issues in Informing Science and Information Technology*, *4*, 511-521.

Moustakas, C. (1994). *Phenomenological research methods.* Thousand Oaks, CA: Sage.

Norman, D. (2002). *The design of everyday things.* New York, NY: Doubleday.

Ogletree, S., & Drake, R. (2007). College students' video game participation and perceptions: Gender differences and implications. *Sex Roles*, *56*(7/8), 537-542. doi:10.1007/s11199-007-9193-5

Othman, N., & Ahamad Shah, M. (2013). Problem-based learning in the English language classroom. *English Language Teaching*, *6*(3), 125-134. doi:10.5539/elt.v6n3p125

Overmars, M. H. (2004). Game design in education. *UU-CS*, (2004-056).

Papert, S. (1980). *Mindstorms*. New York, NY: Basic Books.

Papert, S. (1998). Does easy do it? Children, games, and learning. *Game Developer*. Retrieved from http://www.papert.org/articles/Doeseasydoit.html

Papert, S., & Harel, I. (1991). Situating constructionism. *Constructionism*, 1-11.

Patten, B., Arnedillo Sánchez, I., & Tangney, B. (2006). Designing collaborative, constructionist and contextual applications for handheld devices. *Computers & Education*, *46*(3), 294-308.

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (Rev. ed.). Newbury Park, CA: Sage.

Patton, M. Q. (2001). Evaluation, knowledge management, best practices, and high quality lessons learned. *The American Journal of Evaluation*, *22*(3), 329-336.

Patton, M. Q. (2002). Designing qualitative studies. *Qualitative Research and Evaluation Methods*, *3*, 230-246.

Pennsylvania Department of Education. (2011). *College Enrollment by Sex, Age, Race & Hispanic Origin*. Retrieved from http://www.portal.state.pa.us

Pennsylvania State System of Higher Education (2012). *Indiana University Profile*. Retrieved from http://www.passhe.edu/universities/Pages

Peppler, K. A., & Kafai, Y. B. (2007). From SuperGoo to Scratch: Exploring creative digital media production in informal learning. *Learning, Media and Technology*, *32*(2), 149-166.

Perrone, C., Clark, D., & Repenning, A. (1996, May). WebQuest: Substantiating education in edutainment through interactive learning games. *Computer Networks and ISDN Systems 28*(7), 1307 -1319.

Pershing, J. A. (2006). Human performance technology fundamentals. *Handbook of Human Performance Technology*, 5-34.

Peterson's Nelnet Company. (2011). *At a Glance*. Retrieved from http://www.iup.edu/upper

Polkinghorne, D. E. (1989). Phenomenological research methods. In R. S. Valle & S. Halling (Eds.), Existential-phenemenological perspectives in psychology (pp. 41-60). New York, NY: Plenum.

Powell, R. A., & Single, H. M. (1996). Focus groups. *International Journal for Quality in Healthcare*, *8*(5), 499-504.

Ray, S. G. (2004). *Gender inclusive game design: Expanding the market*. Rockland, MA: Charles River.

Reigeluth, C. (1999). *Instructional–design theories and models: A new paradigm of instructional theory*. Mahwah, NJ: Lawrence Erlbaum.

Reigeluth, C., Watson, W., Watson, S., Dutta, P., Chen, Z., & Powell, N. (2008). Roles for technology in the information-age paradigm of education: Learning management systems. *Educational Technology, 48*(6), 32.

Rieber, L. P. (2004). Homemade PowerPoint games: A constructionist alternative to webquests. Retrieved from http://wwild.coe.uga.edu/pptgames/papers/ppt-games-paper.htm

Robertson, J., & Howells, C. (2008). Computer game design: Opportunities for successful learning. *Computers & Education*, *50*(2), 559-578.

Rosas, R., Nussbaum, M., Cumsille, P., Marianov, V., Correa, M., Flores, P., Salinas, M. (2003). Beyond Nintendo: Design and assessment of educational video games for first and second grade students. *Computers & Education*, *40*(1), 71-94.

Royse, P., Lee, J., Undrahbuyan, B., Hopson, M., & Consalvo, M. (2007). Women and games: Technologies of the gendered self. *New Media & Society*, *9*(4), 555-576.

Rubin, H., & Rubin, I. (1995). *Qualitative interviewing: The art of hearing data*. Thousand Oaks, CA: Sage.

Savery, J. R., & Duffy, T. M. (1995). Problem-based learning: An instructional model and its constructivist framework. *Educational Technology*, *35*(5), 31-38.

Schatzman, L., & Strauss, A. L. (1973). *Field research: Strategies for a natural sociology.* Englewood Cliffs, NJ: Prentice-Hall.

Schmidt, H. G. (1983). Problem-based learning: Rationale and description. *Medical Education, 17*(1), 11-16.

Simons, K., & Ertmer, P. (2005). Scaffolding disciplined inquiry in problem-based learning environments. *International Journal of Learning*, *12*(6), 297-305.

Siwek, S. (2010). Video Games in the 21st Century. *Entertainment Software Association*. Retrieved from http://www.theesa.com/facts/pdfs/VideoGames21stCentury.pdf

Squire, K. D. (2003). Video games in education. *Int. J. Intell. Games & Simulation*, *2*(1), 49-62.

Squire, K. D. (2005). Changing the game: What happens when video games enter the classroom? *Journal of Online Education*, *1*(6). Retrieved from http://www.innovateonline.info/index.php?view=article&id=82

Stager, G. (2005, July). Towards a pedagogy of online constructionist learning. *Proceedings of 2005 World Conference on Computers in Education*. Cape Town, South Africa.

Sterin, C. (2012). *Mass media revolution*. Boston, MA: Pearson Education.

Talja, S., Tuominen, K., & Savolainen, R. (2005). "Isms" in information science: Constructivism, collectivism and constructionism. *Journal of Documentation*, *61*(1), 79-101.

Terlecki, M., Brown, J., Harner-Steciw, L., Irvin-Hannum, J., Marchetto-Ryan, N., Ruhl, L., & Wiggins, J. (2011). Sex differences and similarities in video game experience, preferences, and self-efficacy: Implications for the gaming industry. *Current Psychology*, *30*(1), 22-33. doi:10.1007/s12144-010-9095-5

Thornham, H. (2008). It's a boy thing. *Feminist Media Studies, 8*(2), 127-142. doi:10.1080/14680770801980505

Trochim, W. M. (2006). Qualitative measures. *Research Measures Knowledge Base*, 361-363.

Trochim, W. M., & Donnelly, J. P. (2005). *Research methods: The concise knowledge base*. Cincinnati, OH: Atomic Dog.

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

Van Manen, M. (1998). *Researching lived experience: Human science for an action sensitive pedagogy*. Albany, State University of New York Press.

Van Manen, M. (2003). *Researching lived experience: Human science for an action sensitive pedagogy*. Albany, State University of New York Press.

Von Bertalaffy, L. (1968). *General system theory*. New York, NY: George Braziller.

Weintrop, D., Holbert, N., Wilensky, U., & Horn, M. S. (2012). Redefining constructionist video games: Marrying constructionism and video game design. In C. Kynigos, J. Clayson, & N. Yiannoutsou (Eds.), *Proceedings of the Constructionism 2012 Conference.* Athens, Greece.

Yao, M. Z., Mahood, C., & Linz, D. (2010). Sexual priming, gender stereotyping, and likelihood to sexually harass: Examining the cognitive effects of playing a sexually-explicit video game. *Sex Roles*, *62*, 77-88.

Appendix A

Data Analysis

Data Analysis

Meaning Unit	Condensed Meaning Unit Description Close to the Text	Condensed Meaning Unit interpretation of the underlying meaning	Sub Theme	Theme
(Moira) I'm more of a designer rather than a developer, I would like above and beyond in my head, like its going to be this and then when you're actually making it – its just oh, no I can't do half of that and I end up with a game that I'm not happy with because I couldn't make it like how I wanted it.	I see myself more as a designer because while I can see create grand ideas I don't always have the expereince necessary to create them how she would want the end product to look like.	Preference towards designing due to lack of developing expereince.	Development can be limited by lack of experince or understanding	Developmental skills must be further enhanced to be effective in constructionism
(Miranda) I can think of the best thing to draw or the best thing to do but as far as actually getting to the computer and drawing it and doing it – No, I'd rather be that idea for somebody else and just help them draw it.	I think my skills are in designing and planning ideas out, and rather than creating it in the computer.	Preference towards designing and instructing/aiding developers	Preference towards designing rather than developing	
(Anna) I think its both but for me I think it is more on the experience level cause like when I'm like told to create something I like automatically start like brainstorming in my head and I'll like sketch it out and everything and then like when I go to do it I'll have to like play around with new tools and like it takes longer and then like the way I want to do it I can't do it because like I don't know exactly how the tool works or something like that so.	I enjoy both designing and developing. However, designing comes more easily to me. I often will have to experiment with new technology to in order to use it properly in my design.	Enjoys designing and developing however, lack of developing expereince causes a reliance on experimentation and self-learning	Development can be limited by lack of experince or understanding	
(Barbara) I definitely think of myself as a designer and I don't think its because as much because I like designing but because I don't have experience developing. It's really hard to get classes or find a way to learn how to do a lot of the things that you need to do when making videogames and I would love to learn how to do more developing and I think I would enjoy it a lot more but because I don't have any experience almost at all	I really enjoy designing, but would like to learn more about developing. However I have had a hard time finding opporutnities to learn about game development.	Preference towards designing but would like to do more developing but feels hinderd due to lack of developing expereince.	Development can be limited by lack of experince or understanding	