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Video Game Development Strategies for Creating Successful Cognitively Challenging Games

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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2017

Abstract

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MS, Walden University, 2015

MBA, NC State University, 2004

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

The video game industry is a global multibillion dollar industry with millions of players. The process of developing video games is essential for the continued growth of the industry, and developers need to employ effective strategies that will help them to create successful games. The purpose of this explorative qualitative single case study was to investigate the design strategies of video game developers who have successfully created video games that are challenging, entertaining, and successful. The technology acceptance model served as a conceptual framework. The entire population for this study was members of a video game development team from a small successful video game development company in North Carolina. The data collection process included interviews with 7 video game developers and analysis of 7 organizational documents. Member checking was used to increase the validity of the findings from the participants. Through the use of triangulation, 4 major themes were identified in the study: the video game designer has a significant impact on the development process, the development process for successful video games follows iterative agile programming methods, programming to challenge cognition is not a target goal for developers, and receiving feedback is essential to the process. The findings in this study may benefit future video game developers and organizations to develop strategies for developing successful games that entertain and challenge players while ensuring the viability of the organization. Findings may influence society as they demonstrate where the points of interest should be directed concerning the impact of video games upon behavior of the players.

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Dedication

First and foremost, I want to dedicate this study to my rock, my heart and soul, and my everything, my wife, Veronica. There is absolutely no way I could have completed this without your support. Thank you for helping me to see one of my lifelong dreams come to pass. I want to thank my children, as I know that I have been unavailable on many nights and many weekends while I worked on my study. Makayla, Dre, you have both been very understanding and supportive and I certainly appreciate it. Dre, you have been a special inspiration for me because I have watched and played video games with you since you were old enough to hold a controller, and I have often worried how the games affected you. You are a wonderful young man now, so I am confident that you turned out ok. Lastly, I would like to dedicate this to all of my other supportive family members and good friends who have given me words of encouragement over the years that I have been working on this. Big Mike and Ray, everytime that you encouraged me lifted me up just a little bit more. I hope that I can be as big of an inspiration for someone as you both have been for me.

Acknowledgments

I would like to thank Dr. Gail Miles, my first chair, for all of her help in getting me through this process. Dr. Miles has a way of taking the complicated and making it easy for me to understand. Thank you for you encouragement as I stumbled some along the way. I would also like to thank Dr. Steven Case as my second chair and mentor. You have been a source of knowledge and inspiration for me, even helping me when I was not in your course. That will never be forgotten. I would like to thank Dr. Bob Duhainy for taking the time to review my work as my URR.

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Section 1: Foundation of the Study

Background of the Problem

Video gaming is a popular hobby that has millions of active gamers. A 2015 report from the Entertainment Software Association (ESA) demonstrated that the video game industry generated more than 22 billion dollars in sales in 2014 and has more than 63 million Americans who regularly play at least 3 hours a week (ESA, 2015). Given the popularity, growth of the industry, and wide variety of people who play games, there may be a significant impact upon the culture. Per Carnagey, Anderson, and Bushman (2007), some past researchers have indicated that violent video gaming can lead to desensitization to real-life violence while others have proposed that prosocial behavior in games can yield prosocial behavior. Thompson (2012) asserted that serious video games are a special type of video game designed to elicit some sort of change (attitudinal, behavioral, belief, etc.) while maintaining the entertainment value, and that the concept of developing games that are both entertaining and responsible is in its infancy with the need for additional research.

While there are indications of some positive links between video game play and increased cognition (Collins & Freeman, 2014), little has been written about the challenges faced by developers to create socially-responsible games. This is an area that presents the need for exploration and has the potential to have a significant impact upon the video game industry and society.

Problem Statement

While a source of entertainment for many, video games can provide a powerful channel for reaching players of all ages, genders, and races, and through this channel can provide potential benefits to the players (Granic, Lobel, & Engels, 2014). Only 10% of video games earn a profit, and almost half sell fewer than 10,000 copies (Cox, 2014), indicating that very few video games that make it to the market are successful. The general information technology (IT) problem is that while some video game developers focus on creating entertaining and profitable games, most of the published games fail to meet gamer expectations and end in failure. The specific IT problem is that some video game developers in North Carolina do not have design strategies that produce challenging yet entertaining video games that remain successful in a competitive video game market.

Purpose Statement

The purpose of this qualitative study was to investigate the design strategies of video game developers in North Carolina who have successfully created video games that are challenging, entertaining, and successful in the competitive video game market. In this study, I used a case study design approach with interviews of video game designers and a review of internal organizational documents such as memorandums, design documents, and organizational project management documentation. The specific population for this study included video game programmers, designers, project managers, and producers who have developed commercial video games within the past 5 years. The geographical setting for the study was the state of North Carolina in the United States. Researchers have demonstrated that video game play may affect cognition and influence

behavior of the players (Kim, Park, & Baek, 2009). The completed study is expected to promote social change because, as video game programmers learn the best practices that have been successful in creating challenging action games, they will be able to create even more games that challenge the players' cognition, learning, and behavior attributes.

Nature of the Study

The approach for this study was qualitative. The specific IT problem can be addressed using quantitative or qualitative methods. Quantitative studies allow researchers to examine the relationships between variables using scientific, statistical approaches while qualitative studies allow the study of complex processes and phenomena through the experiences of the participants (Bentahar & Cameron, 2015). In researching the problem statement for this study, a quantitative study needs to include independent variables that may serve to demonstrate a clear pattern for determining how the video games affect the attributes, the dependent variables. This type of study has the benefit of straightforward analysis, but because this study was explorative, a quantitative study was not appropriate to fully address the topic. The mixed methods approach combines elements from quantitative and qualitative approaches and allows the researcher to take advantages of the strengths of each method while reducing the impact of the relative weaknesses of each approach (Buckley, 2015). Mixed method studies require expertise in both qualitative and quantitative methods and may result in the need for substantially more required time than either method alone (Stockman, 2015). The context of this study was to explore the strategies used by video game developers to create challenging yet entertaining video games that remain relevant in a competitive

environment. The advantage of using a qualitative approach is the ability to gain an in-depth understanding of the challenges associated with creating this type of software as well as to examine the far-reaching consequences of the success or failure thereof. Disadvantages to conducting a qualitative study may include the need for direct access to the developers to conduct interviews for the study and may become a very time-consuming process. Qualitative studies can provide the context necessary to understand the phenomena whereas quantitative studies usually can establish what happened but with no explanation for it. Given this, a qualitative approach was more appropriate than a quantitative or mixed-method approach for this singular study.

Researchers have defined a number of designs appropriate for qualitative studies. The ethnographic research approach focuses on understanding and examining the culture within an organization (Ayar, Bauchspies, & Yalvac, 2015). I did not choose this design because the focus of this study was not on the cultural issues associated with the video game development environment, team, or organization. Phenomenological studies examine the individual's experience as impacted by certain phenomenon (Daghan & Akkoyunlu, 2014). The individual focus of phenomenological studies preclude this as a type of design, as the study did not address a phenomenom nor the individual video game designer. I have chosen the case study design for this research document. The case study research approach is one in which the investigator explores a phenomenon using actual real-life data and is identified by researchers as a good research method for software projects (Garzás & Paulik, 2013). Case studies offer the examiner the opportunity to gather substantive information from the participants, which could lead to new ideas,

better communication, or new research areas or questions (Murray, Pennington, Enderby, & Goldbart, 2014). Different data collection methods help to ensure triangulation of the information (Daghan & Akkoyunlu, 2014). Information was gathered via methods to include direct observations, interviews, and company-provided documents, reports, and audiovisual materials. The case study method was best suited for this research document.

Research Question

What are the strategies used by successful video game developers in North Carolina for designing video games that produce challenging yet entertaining and successful video games in a competitive video game market?

Interview Questions

The following interview questions addressed the research question for this study:

1. Please briefly describe the process that you use when determining which video games you will develop.
2. How do you prioritize which features you will include in the video games?
3. What impact do social issues such as gender, race, religion, and sexual orientation have upon your video game process development?
4. Violence in video games is a hotly contested subject. Describe how you balance the use of violence in your games with creating a socially acceptable product.
5. Please describe the primary steps that you use when developing video games.
6. What measures do you take to ensure that your video game will be accepted or played by the greatest number of people?

7. How do you ensure that your game includes proper challenges and goals that are tailored to your targeted genre or audience?
8. How do you receive feedback as to whether your game has been successful?
9. How do popular culture events impact your video game development?
10. What design processes do you use to ensure that your game challenges the cognition of your players?
11. How do you work with others in the organization to ensure that the video game meets established marketing and technical goals?
12. What do you program into the games to gain and keep the attention of your players?

Conceptual Framework

I used the technology acceptance model (TAM) as my conceptual framework. Davis (1985) developed the model in 1985 based upon the theory of reasoned action's (TRA) casual relationship belief-attitude-intention behavior, which was developed to predict user acceptance of an information system technology. The model illustrated that external variables affected the perceived usefulness and ease of use, which in turn influenced behavioral intention and actual system use. Several models subsequently extended the original model. These models include the TAM 2 in 2000, the unified theory of acceptance and use of technology (UTAUT) in 2003, and TAM 3 in 2008 (Fador, 2014). TAM 2 took into account the impact of social influence and cognition (Fador, 2014). The UTAUT framework includes eight different technology acceptance theories, including the TRA, TAM, the theory of planned behavior (TPB), motivation theory, the

hybrid model of TPB and TAM, the PC utilization model, and the social cognitive theory (Huang & Kao, 2015). The TAM appears well-validated by scholars and research, as it has substantial theoretical and empirical findings that demonstrate its potential for predicting technology acceptance (Ashraf, Thongpapanl, & Auh, 2014).

Players play video games for a variety of reasons. Thirty one percent of gamers most often play social games, 30% of gamers play for action, and 30% play puzzle/board games, game/card/game shows (ESA, 2015). An understanding of why the players play the games helps to shape the reasons behind the strategies for game development. The TAM provides a perspective for understanding these motivations and their impact upon the decision-making process of the video game developers.

Definition of Terms

The content of this study is effective video game design. There may be terms and acronyms that may be unfamiliar to readers. The following description defines or provides contextual meaning to such a term.

Massively multiplayer online role-playing games (MMORPGS): Internet-only, dynamic, and highly interactive computer-gaming experience with a fully developed multiplayer universe and an advanced and detailed visual and auditory world (Yousafzai, Hussain, & Griffiths, 2014).

Assumptions, Limitations, and Delimitations

Assumptions

Assumptions are things contained in the study that are considered true but without objective proof (Ellis & Levy, 2009). Certain assumptions, or facts assumed to be true

but not verified, for my study include the following: The first is that the video game designers have experience designing video games that have been found to be successful in a competitive video game market, and the video game designers represent themselves accordingly and fit the established qualifying criteria. The next assumption is that the video game designers answered truthfully when questioned.

Limitations

Ellis and Levy (2009) indicated that limitations are things that may threaten the internal validity of the study. My study was limited by the relatively small population size of actual video game developers located in the Raleigh, North Carolina area. The answers given represented their experiences only and may not be able to be applicable to all designers without further research. This limitation is addressed later in the study as it affects the sample size and validity of the findings.

Delimitations

Delimitations establish what the researcher will not include in the study, establishing the boundaries of the research to make it more manageable (Ellis & Levy, 2009). My study included video game designers from only one organization who have participated in designing at least one successful video game. In addition, the geographical boundaries of this study include only the Raleigh, North Carolina and surrounding areas.

Significance of the Study

Contribution to Information Technology Practice

Technology continues to advance at a rapid pace, and one of the elements on the forefront of the advancement is that of designing video games. The market for video

games has grown substantially within recent years, and there is substantial documentation and studies on the effects that video games have upon the behavioral aspects of the players (Adachi & Willoughby, 2017). Successful games have an arguably addictive quality to them, resulting in long and repeated play and increased sales, regardless of the effect upon behavior (Yousafzai et al., 2014). However, even though companies invest substantial revenue and resources into video game design, creating what amounts to successful games is often fleeting and challenging (Cox, 2014). As such, the value to IT practitioners is that the findings may provide an understanding of design strategies used by successful video game designers who have created games that are considered as mainstays within the gaming community.

The findings could provide a basis for establishing best practices that will allow them to create successful video games faster and more efficiently. As such, the ability to create games based upon the design practices of other successful gamers should lead to an increased ability for designers to create successful video games. The study can also prove beneficial to new IT practitioners who need a start in creating effective processes as they begin to learn the processes involved in creating video games for the general public.

Implications for Social Change

The anticipated contribution to positive social change is that the study may lead to more video games that successfully challenge the cognition and decision-making of the players. As the video game industry continues to grow, the impact of the games upon the players is also likely to continue to expand. Video games are different than other media

such as books, movies, and television because the users have a direct impact upon the story and are very involved in the ongoing plot development. Some studies have demonstrated that this has an impact upon the gamers even after they have completed playing, more so than watching a movie or reading a book (Carnagey, Anderson, & Bushman, 2007). The successful games enable the players to play through real-world situations, challenge the players' decision-making skills, and provide cognitive challenges that enable real growth, all while providing entertainment that encourages multiple play-through.

A Review of the Professional and Academic Literature

The focus of the literature review was to examine factors in the video game industry that affect the strategies that video game designers use when developing their games. The goal of the review was to critically analyze the existing research in order to identify the issues faced by the video game designers for creating successful games. This literature review details how information was collected and provides an overview of the sources found. The conceptual framework as well as alternative conceptual frameworks are discussed in detail. In the final part of the literature review, the video game industry and the need for well-crafted designs to create successful video games are discussed. The TAM provides the foundation for the research as its constructs form the framework for examining why new video games may be accepted or rejected by the gaming community.

The literature review includes evidence from a wide variety of resources. The primary resource was the Walden University library. In particular, the majority of the searches were conducted using the Thoreau multidatabase search tool, which provides

searches within the Walden University library system of databases. I also used Google Scholar to find additional peer-reviewed documents. To a lesser degree, I performed searches on the Internet via Google to find definitions of commonly used terms not easily found in the academic literature. During my search, I fount that the publications that may be most closely related to the study include the International Journal of Science Education, the Journal of Experimental Social Psychology, and the Journal for Information Systems. I used a variety of key words for the research, including the following not all-inclusive list: *TAM, cognition, development, effects of intrinsic and extrinsic motivators, Fishbein, HMSAM, innovation diffusion theory, new technology acceptance, product acceptance, product innovation, qualitative design, serious video gaming, TAM, TAM2, TAM3, technology acceptance, TPB, TRA, UTAUT, video game, video game development process*, and *video game design*. These keywords helped produce a purposive sample, enabling the examination of the history, conceptual theories, and issues associated with video game development. 89% of the 138 total sources used were peer-reviewed with 89% of the 138 sources within 5 years of date of completion of this study.

Conceptual Framework

This review illustrates the origin and the growth of a commonly accepted model, the TAM, and how this model has been reviewed and used over the years. The TAM and its variants are predictive models that allow the users to determine how well-accepted a new innovation may be. The constructs of this model are examined in detail within the literature review. The findings demonstrate how some researchers have successfully used

the TAM or other similar models to help them to produce successful products. I applied the constructs of the TAM to my qualitative findings, as this model provided the lens through which I examined the design decisions for the video game developers as they work to ensure that their innovations are widely accepted by their gaming communities.

The TAM

There are several theoretical or conceptual models that have been proposed or used to examine the motivations behind an individual's acceptance of a technology and are examined in this literature review. The TAM is widely used to help explain or examine the causal reasons behind an individual's acceptance of new technologies (Adetimirin, 2015). The TAM was first proposed by Davis in 1985 in partial fulfillment of his PhD. The purpose of the TAM was to provide an explanation of the determinants for technology acceptance, which explain the behaviors of the users (Davis, 1985). The TAM is based on a prior model called the TRA. The TRA, as proposed by Ajzen and Fishbein (1977), indicated that a person's behavioral intention to perform a specified action is directly influenced by the person's attitude toward the behavior in combination with the subjective norm regarding the action. Figure 1 illustrates the TRA (Fador, 2014). This model is the basis for many others where individuals are usually rationale and consider consequences before taking action, leading the researchers to develop the key construct of behavioral intention (BI; Yung-Ming, 2015).

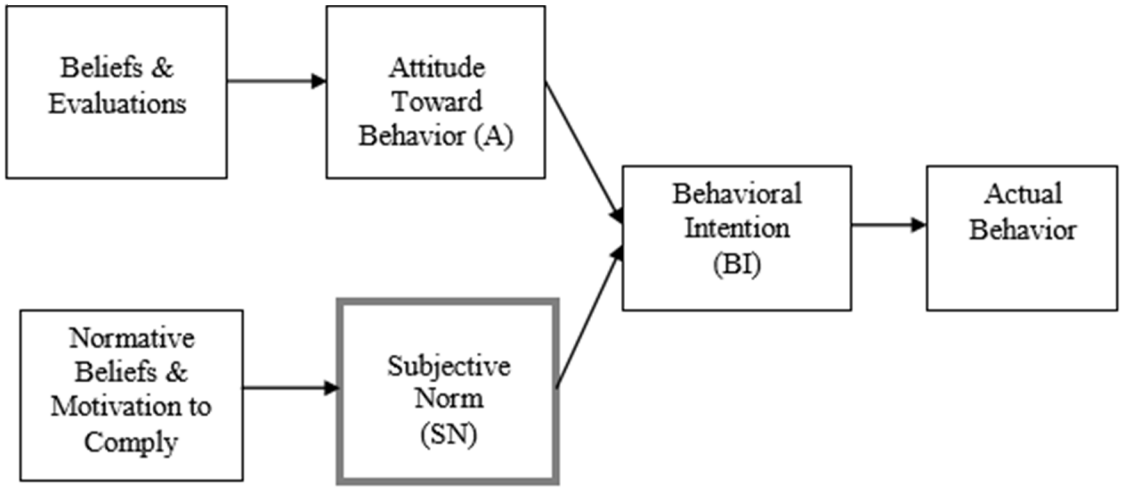

Figure 1. Theory of Reasoned Action (TRA). From "Innovation and Technology Acceptance Model (TAM): A Theoretical Approach," by A. Fador, 2014, *Romanian Journal of Marketing*, p. 65. Copyright 2014 by Romanian Journal of Marketing. Reprinted with permission.

The TAM, as proposed by Davis (1985), removes the highlighted box (subjective norm) in the TRA and expands upon the concept of the impact of attitudinal behavior as the major influence on the actual behavior or actual system use. The TAM is widely accepted globally in large reason because of the substantial studies that verify its usefulness through empirical testing (Zamani & Shoghlabad, 2012). Davis proposed that external factors influence the two primary constructs of perceived usefulness and perceived ease of use, consider the cognitive responses, and influence the attitude, or the affective response, which influence the attitude towards the actual system use, as illustrated in Figure 2.

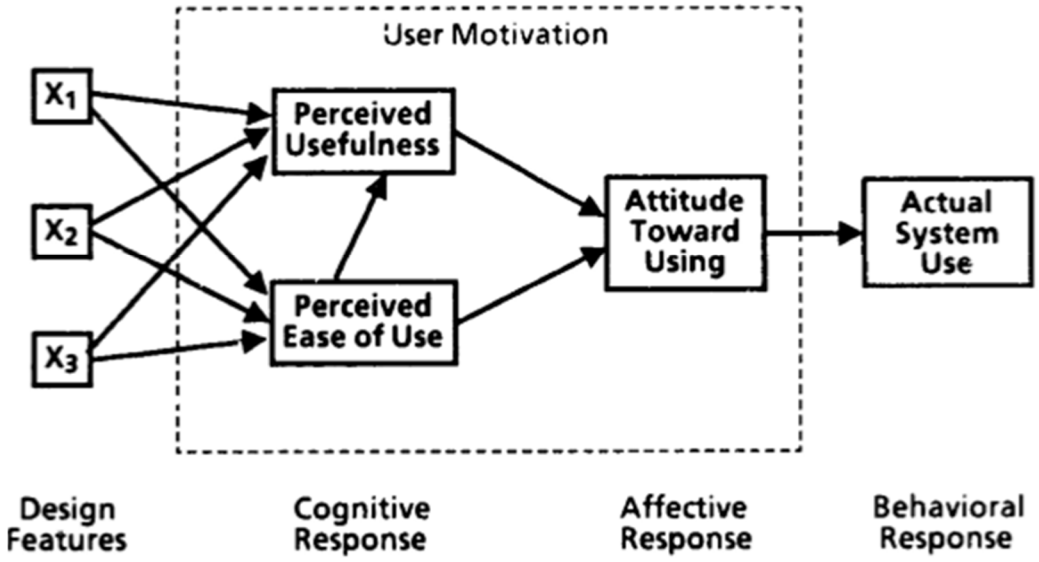

Figure 2. Technology Acceptance Model (TAM). From "A technology acceptance model for empirically testing new end-user information systems: theory and results," by F. Davis, 1985, *Doctoral Dissertation*, p. 24. Copyright 1985 by Massachusettes Institute of Technology. Reprinted with permission.

Alternate Models and Extensions

Technology growth has led to many innovative products and services that have revolutionized industries over the years (Gerdewal & Secim, 2014). Fador (2014) found that the new technologies affect not only the products and services but also the very operational processes within organizations. Organizations must innovate from within in order to be competitive or risk being left behind by their competitor within their respective industries (Fador, 2014). Understanding how and why people adopt new technologies is therefore vital to business and organizational leaders, and, as such, as Fador intimated, there has been substantial effort put into defining and understanding the adoptions of new technologies and technological products. According to Yucel and Gulbahar (2013), researchers have worked to define and understand the elements that

influence the acceptance or adoption of technology as it has a direct impact upon the expected usage of such.

In addition to the TAM and TRA, there have been other models developed over the years to attempt to examine and predict the acceptance levels of technology. Other models include the innovation diffusion theory, also referred to as the diffusion of innovation theory, as developed by Rogers (1995), the TPB proposed by Ajzen (1991), and the UTAUT by Venkatesh et al, (2003). Multiple empirical examinations of TAM have demonstrated that it is more stringent, provides more prudent findings, and demonstrates stronger relations between the findings and constructs when compared to the other models (Yucel & Gulbahar, 2013).

The innovation diffusion theory or diffusion of innovation theory, as proposed by Rogers (1995), focuses on the diffusion of technology within a social environment, its rate of adoption, and how the technology is communicated throughout the society (Al-Zoubi, 2013). According to Al-Zoubi (2013), the diffusion of innovation theory demonstrates that the adoption of innovation is based on primarily two elements, the perception of the characteristics of the technology and the user's perception of the system (Al-Zoubi, 2013). As seen in Figure 3, constructs for the innovation characteristic include relative advantage, compatibility, complexity, "trialability," and observability while organizational constructs include centralization, complexity, size, slack, formalization, and interconnectedness (Al-Zoubi, 2013, p.70). This model focuses primarily on the organizational level of technology innovation adoption (Tarhini, Hassouna, Abbasi, & Orozco, 2015)

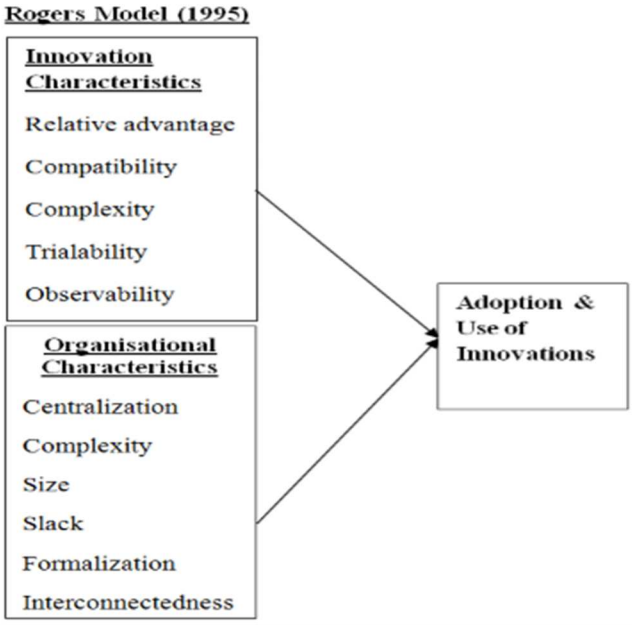

Figure 3. Roger's model. From "Predicting E- Business Adoption through Integrating the Constructs of the Rogers's Diffusion of Innovation Theory Combined with Technology Organization-Environment Model", by M. Al-Zoubi, 2013, *International Journal of Advanced Computer Research,* 3, p. 73. Copyright 2013 by International Journal of Advanced Computer Research. Reprinted with permission.

Moqbel, Charoensukmongkol, and Bakay (2013) added the construct of perceived behavior control, yielding now three constructs that consisted of the aforementioned perceived behavior control in addition to attitude and subjective norm. According to Chu, Chau, and So (2015), this theory has been applied in a wide variety of areas, not just in technology and business. It has been used to explore ethical issues, has been found to be useful in predicting behaviors in a variety of areas, and is designed to explore intentions.

Venkatesh, Morris, Davis, and Davis (2003) developed the UTAUT model, which was also derived from the TRA. It includes components developed by Davis (1985) as well as the extended TAM2 model developed by Venkatesh and Davis (2000). In addition

to these three models, the UTAUT model integrates the TPB motivation theory, the hybrid model of TPB and TAM, the PC utilization model, and the social cognitive theory (Huang & Kao, 2015). The effect of combining these eight theories resulted in the UTAUT model's use of the following six constructs: performance expectancy, effort expectancy, social factors, facilitating conditions, behavioral intention (BI), and use behavior (Thomas et al., 2014). This model's primary focus is at the organizational level. In order to understand technology acceptance at the individual level, Venkatesh et al. (2012) developed the UTAUT2. Venkatesh et al demonstrated that three new constructs were added to the UTAUT model to create the UTAUT2: hedonic motivation, price value, and habit. These new constructs are believed to be important factors for predicting user adoption of technology, according to Huang and Kao (2015), as they provide insight into factors such as pleasure, price points, and automatic behaviors of the potential users. Figure 4 illustrates the UTAUT2 model to include the additional constructs (Huang & Kao, 2015).

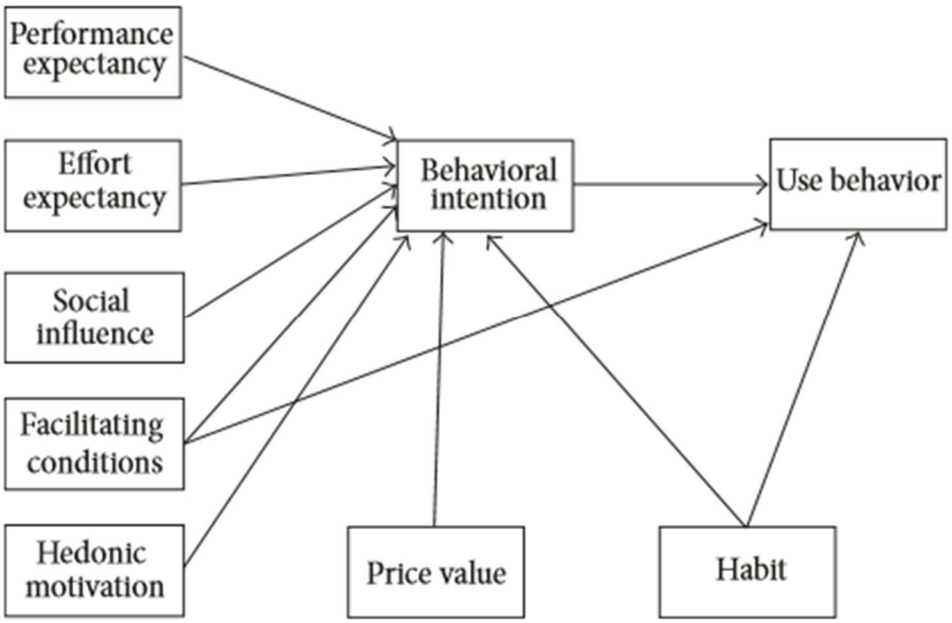

Figure 4. UTAUT2. From "UTAUT2 Based Predictions of Factors Influencing the Technology Acceptance of Phablets by DNP," by C-Y. Huang and Y-S. Kao, 2015, *Mathematical Problems in Engineering,* p. 17. Copyright 2015 by Hindawi. Reprinted with permission.

Constructs of the TAM

In this section, I define the constructs for the TAM as noted from researchers and consider some of the noted criticisms of the TAM. As mentioned previously, the primary constructs within the TAM are perceived usefulness (PU), perceived ease of use (PEOU), and the attitude toward using (ATU). Davis (1985) defined PU as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 26) and PEOU as "the degree to which a person believes that using a particular system would be free of physical and mental effort" (p. 26). Tarhini et al. (2015) defined ATU as "the degree to which an individual evaluates and associates the target system with his or her job" (p. 32). Svendsen, Johnsen, Almas-Sørensen, and Vittersø (2013) demonstrated

that there exists a strong relationship between PU and the BI and that the PEOU influences BI through PU. Ashraf et al. (2014) and Tarhini et al., as proponents to the TAM, have argued that the theory may not be robust enough to cover all situations, including, for example, cultural differences when applying the model in Western or nondeveloped countries. The significance of applying the TAM in a global setting appears high, especially since the video game industry is a part of global community and, according to Adachi and Willoughby (2013), has a market value of $67 billion as of 2010 and a projected value of $112 billion in 2015. Many researchers who use the TAM have found it viable, but recommend that it be modified or extended as necessary to make it more reliable (Al-Azawei & Lundqvist, 2015; Tarhini et al., 2015). Tarhini et al. asserted that there exists the need to validate the measurement scales of the TAM within each culture to ensure reliability.

Although widely accepted, additional limitations or challenges to the model and its constructs exist. According to Teo and Jarupunphol (2015), two such limitations include that the model does not account well for antecedent variables which could affect the initial constructs and secondly no model could be expected to fully explain human behavior as there are any number of factors that may motivate a given person into action or inaction. Several studies have extended the TAM to fit certain cultural needs or to address limitations. For example, the Dhammic framework as defined by Teo & Jarupunphol postulated that the addition of the construct of attachment, adapted from Buddhism, would strengthen the TAM's reliability and address criticisms which indicate that the TAM too simplistically addresses acceptance of technology (Teo & Jarupunphol,

2015). While the study performed by Teo & Jarupunphol demonstrated positive findings, the study was limited and would need additional validation before it is widely accepted as a viable modification to the TAM. Another study conducted by Hou (2014) directly compared the constructs of three models: the theory of planned behavior (TPB), TAM, and the decomposed TBP (DTBP) in the adaption of business intelligence systems. The findings demonstrated that while the TAM provided reliable and acceptable findings, the TPB and DTBP were actually better predictors for the use of business intelligence systems, further illustrating again that without modifications, the TAM cannot be universally applied and cannot simply be assumed as the best technology acceptance theory (Hou, 2014).

Technology's uses have evolved since Davis (1985) first proposed the TAM from productivity oriented business focused tasks to other areas to include entertainment for individuals and within homes (Jiming & Xinjian, 2013). According to Jiming and Xinjan the uses are sometimes, but not always productivity-oriented and many uses are simply for the pleasure of the user. As such, while PU may be the strongest determinant construct in business-only or utilitarian systems, this construct is not as useful when hedonic factors are in play and the researchers must consider extending the TAM to include additional constructs such as perceived enjoyment (PE; Jiming & Xinjian, 2013). Kauer and Bruder (2013) poses that since the focus of the TAM appears to be on predicting the use of utilitarian products, many consider the model not to be a good indicator for hedonic focused systems or products.

Yoon et al (2013) proposed the model illustrated in Figure 5 in attempting to close the gap between the usefulness of the TAM in utilitarian systems versus hedonic systems by extending the model to include the PE construct in addition to other modifications. The original TAM model is in the rectangular area. This model adds the constructs of PE, in addition to perceived economic value (PEV) and perceived critical mass (PCM). The study by Yoon et al focused primarily on online gaming systems. Yoon et al found in their study significant relationships between PE, PEV, and PCM and attitude towards playing games. The role of entertainment as a construct will be discussed further in the following sections on the TAM3 and the Hedonic Motivation System Adoption Model (HMSAM).

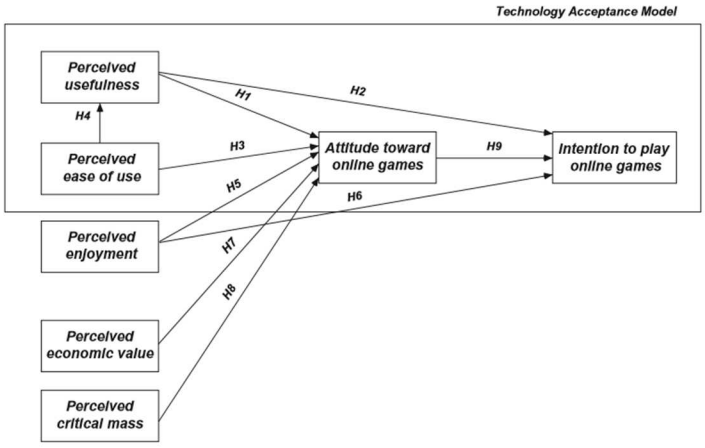

Figure 5. Yoon Model. From "Gamers Just Want to Have Fun? Toward an Understanding of the Online Game Acceptance", by Gunwoo Yoon, Brittany Duff, & Seongho Ryu, 2013, *Journal of Applied Social Psychology, 43*, p. 1818. Copyright 2013 by John Wiley and Sons. Reprinted with permission.

Although the TAM was extended by Venkatesh and Davis into TAM2, the authors continued to focus on the utilitarian aspect of the model. It is not until TAM3 where a construct for PE is included in the model (Fador, 2014). This extension (TAM3) addresses the previously identified limitation regarding the TAM and helps to provide additional predictive ability for systems beyond the utilitarian (Venkatesh, 2000). Through this extension, Venkatesh (2000) in his seminal study of TAM3, provided additional information regarding the antecedents to the PEOU construct by integrating constructs such as general computer playfulness and perceived enjoyment to the TAM.

An extension to the original TAM as proposed by Davis (1985), is the HMSAM as proposed by Lowry et al (2013). As mentioned previously, the evolution of technology has expanded beyond its initial utilitarian use only and is used for enjoyment at ever growing rates and although several models have been extended to include factors that account for the behavioral intention due to the pleasure factor, there are no models which focus exclusively on this area (Lowry, Gaskin, Twyman, Hammer, & Roberts, 2013).

The seminal study by Lowry, Gaskin, Twyman & Roberts (2013) demonstrated that the research and findings of the HMSAM model could be valid for examining the use of systems, but this model is not well-validated by other studies and thus is provided here only as a future potential alternative model to the TAM. The validation of any model is beyond the scope of this examination and, as such, I will not attempt to validate the HMSAM. Additionally, studies have indeed validated that the TAM extensions provide reliable findings for hedonic systems and have demonstrated how social factors such as normative influence as well as enjoyment impact the BI (Hansen & Lee, 2013).

Therefore, the need for using HMSAM during this particular research is minimized although future examiners may wish to revisit the HMSAM in other settings. The TAM3 and the model proposed by Yoon in addition to the HMSAM, demonstrate the inherent need to include the PE construct when assessing technology and provide a valuable resource for my study.

Future Directions for the TAM

Per Balint & Arnett (2014), technology, once thought of as a supporting facet of an organization, has become an important strategical element which has served as a differentiator for core product delivery for businesses, enabling them to deliver faster to the market or at a better price than their competitors. Not all new technology is accepted and implemented or found useful at first and the decision to use or not to use is dependent on the situation and need (Yucel & Gulbahar, 2013). Additional research is needed to understand the decision-making process for determining the usefulness of new technologies and the reasons for adopting or rejecting them as well as the time it takes to accept new innovations (Fador, 2014; Yucel & Gulbahar, 2013; Wang & Hsieh, 2015). Models examined during this study can be applied for assessing the acceptance of new technologies and includes a detailed look at the TAM and other alternatives which are designed to guide the technology decision-making process.

Although the TAM is well accepted and is considered as more parsimonious than other models, it is not without limitations (Yucel & Gulbahar, 2013). Technology continues to evolve and one of the changes is that the use of technology in many areas is being made easier for the user (Yucel & Gulbahar, 2013). According to Yucel and

Gulbahar, at a certain point, it is reasonable that ease of use of a technology may no longer be a key determinant. This is a key construct for the TAM and, as such, this predictor variable should be looked at closely for any organization that uses the TAM as its decision model (Yucel & Gulbahar, 2013). Fador (2014) asserts that there is also some question regarding the accuracy of the theoretical model even after extensions via TAM2, TAM3, and UTAUT, given the self-report nature of the participants in the previous studies. The issues of applying the TAM outside of Western culture as identified in studies by Tarhini et al. (2015) and Ashraf et al (2014) presented additional possible avenues for future research.

The Video Game Industry

The video game industry has grown significantly since its inception and has evolved into a large market (Osathanunkul, 2015). According to Osathanunkul, industry figures demonstrate that worldwide revenue from the video game industry exceeded $76 billion in the United States alone in 2013 and has become the fastest growing segment of the entertainment industry. A recent study by ESA (2015) reported that there are over 155 million Americans who play video games with an average of two video game players per US household and 42% of Americans who play games three or more hours per week (ESA, 2015). Video game play is not limited to just game consoles such as the PlayStation, Xbox, or Nintendo, but also those played on personal computers, smartphones, and other wireless devices such as tablets. According to the figures from the ESA (2015), dedicated consoles are used by 56% of gamers, the PC is used by 62% of gamers, and smartphone by 35% of gamers. The types of games played range from

cognitively challenging games such as puzzles and board games to social and action games. Hansen and Lee (2013) emphasized the social aspect of gaming as another facet of video gameplay. Some reports indicate that over 53 million Americans played social network games (SNG) played on sites such as Facebook and other social sites in 2010 (Hansen & Lee, 2013). As the games have evolved from single player to multiplayer and on to social play with dozens of others on the social sites, another key trend has also emerged, that of the massively multiplayer online role-playing games (MMORPGS) (Fuster, Chamarro, Carbonell, & Vallerand, 2014). These games allow hundreds and thousands of players the ability to play online cooperatively with or competitively against one another in pursuit of established goals or quests (Rezaei & Ghodsi, 2014).

Challenges for Video Game Designer

As noted, the video game industry is a competitive rapidly growing industry (Osathanunkul, 2015). Video game designers face the challenge of creating video games that attract, challenge, and retain players over a very broad spectrum of video game types (Granic et al., 2014). Figure 6 illustrates an example of the various genres of video games and how they fit on the scales of social and complexity as defined by the American Psychological Association (Granic et al, 2014).

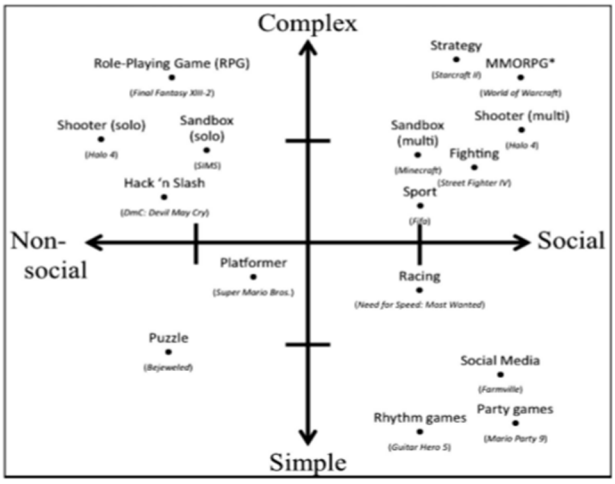

Figure 6. Conceptual Map of Main Genres of Video Games. Adapted from "The Benefits of Playing Games", by I. Granic, A. Lobel, and R. Engel, 2013, *American Psychologist, 69,* p. 70. Copyright 2013 by American Psychological Association. Reprinted with permission.

Figure 6 is not all-encompassing, but provides an illustration of the number of types of video games currently on the market (Granic et al., 2014). Granic et al. stated that the successful video game designer is able to motivate people to play games by presenting them with challenges that allow them to celebrate virtual successes and accomplishing meaningful goals within the gaming environment. Indeed, according to McNeill (2013), one of the goals for video game designers is to create a game that not only attracts gamers in their targeted genre, but to make it so engrossing that the players lose the sense that they are even playing a game at all. This is not always a positive thing per Kuss, D. J., Louws, J., & Wiers, R. (2012) as some games appear to have addictive properties, and this is a growing concern for researchers, gamers, and others associated with the video game industry. In the study conducted by Kuss, D. J., Louws, J., & Wiers, R. (2012), they also found that players who played games to escape reality often experienced more problems as a consequence of playing, and that this escapism is a good

predictor of problematic gaming. While this negative issue is likely to remain an issue within the video game industry for the foreseeable future according to Granic et al. (2014), the question of whether extensive gaming, per Fuster, Chamarro, Carbonell, & Vallerand (2014) is an addiction or a result of the need for extensive game play to accomplish objectives is an area for additional research for future studies.

Video Game Design

The process by which video game designers create the games includes multiple considerations such as choosing and coding the game environment (Ma, Vining, Lefebvre, & Sheffer, 2014), genres and the sophistication of the artificial intelligence component of the game (Sadafi, Fonteneau, & Ernest, 2015), challenges associated with creating storylines that flow within the context of the game (Lindenroth, 2015), and even social issues such as responsibility of programmers in dealing with potential gaming addiction as suggested by Yousafzai et al. (2014). According to Folkins, Brakenbury, Krause & Haviland (2016), video game design is built on general principles that can number in the hundreds, vary from designer to designer and are not necessarily applied by every programmer when designing the games. For example, in their review, Folkins et al (2016) chose to examine six design principles (the essential experience, discovery, risk taking, generalization, and rewards systems) while McNeil (2013) provided that many designers start with a model that includes four steps which are to gain and keep the players' attention, establish the goal, unleash the action, and to present a final challenge. These ten areas are but a subset of a much larger number of principles that designer must consider when creating their games (Folkins et al, 2016).

According to Yousafzai et al. (2014), gaining and keeping the attention of the game is paramount to any successful video game as producing games without an attention-getting wow-factor is fruitless. Sustaining attention goes beyond just attracting players to play the game. Per Ahmad, Rahim, & Arshad (2015) designers of educational video games, for example, understand that maintaining the attention of the players for this genre helps to enhance the learning process, thus increasing the value or chances for success for their video game.

One of the key aspects of video games is the challenge to accomplish a goal or series of goals throughout the course of play by starting with easy and then progressing to more difficult tasks (Granic et al., 2014; Adachi & Willoughby, 2013). According to Adachi & Willoughby, this design keeps the players engaged and motivated as they cannot advance until they have accomplished the goals at a current level. Wirth, Ryffel, von Pape & Karnowski (2013) and Eichenbaum, Bavelier, & Green (2014) add that as the gamers get better, the game ideally becomes more challenging such that when a player does complete a task, the sense of accomplishment keeps him or her coming back. Indeed, according to Eichenbaum et al (2014) designers want the gamers to fail, but not fail so badly that they quit playing.

Accomplishments of these in-game goals may lead to cognitive gains (Hamlen, 2014). Hamlen (2014) demonstrated that the strategies used in gaming to overcome obstacles had a positive correlation to higher academic performance by the gamers. This study was consistent with a study by Adachi & Willoughby (2013) who demonstrated similar findings and added that *strategic video games,* i.e. games that involve acquiring

knowledge and applying it strategically prior to attempting a task, may enhance the problem-solving ability of the player. Designers must consider the effects that the challenges may have upon the players and if those effects are desirable given that easy challenges may drive away players due to lack of interest whereas challenges that significantly exceed the skill set of the player may have a similar effect (Ahmad, Rahim, & Arshad, 2015). The concept of challenges or difficulty is often addressed via a leveling system and designers must account for leveling during the game as well as transitions to other challenges (Lindenroth, 2015). The determination of the appropriate level must be made by the video game designer and according to Eichenbaum et al (2014) many provide the option of allowing the players to choose their own level of challenges beginning at casual for inexperienced players to very difficult levels for the more experienced players or those who want a significant gaming challenge. Video game designers often use some sort of reward system as related by Folkins et al (2016) who indicate that these can include in-game badges, trophies, additional video clips, powers, resources, and more to keep players engaged and returning.

In addition to creating challenges and leveling up, successful games sometimes use the art of storytelling to capture and maintain the attention of the gamers although according to Lindenroth (2015) this concept was not readily used in early video game creations. However, in today's video games, to successfully complete many of the games, the players must progress through an established storyline as a character, making decisions that often require decision-making and cognitive processing (Roswell, Pedersen, & Trueman, 2014). According to Roswell et al, the concept of storytelling in

games can make it a compelling reason for continued and repeated play by the games. Lucas (2015) adds that storytelling in games is vital as it affects the replay value which is essential to creating successful games and, as such, this facet of the design process deserves further and continued exploration.

Innovation is one of the keys to success for video game designers when it comes to creating successful games (Katzenbach, Herweg, & Van Roessel, 2016). Some companies have used the concept of modding to help create extensions to their games (Wallace, 2014). Modding, as defined by Wallace (2014) is a programming method that allows anyone including common users to change the programming within a game to customize game play, colors, or any other aspect of the game, even the very nature of the game. This concept has been used by major developers such as Valve to drive collaboration between the gamers and developers as well as by companies such as Bethesda to assess talent of potential developers (Wallace, 2014). Wallace also adds that the use of modding has enabled companies to produce games that keep players coming back for repeated play because they feel that the company values their input. While modding allows designers to extend video games, many new video games are not really new and draw upon the successful features of previous video games according to Katzenbach et al (2016). According to Katzenbach et al, imitation is not only rampart within the video game industry, it is essential to its success as designers build upon features developed by others to create new techniques, game designs, and even genres.

Social Impacts Upon Videogame Design

A significant issue within the videogame industry is the effect that the games may have upon the behaviors of the players, and there are a number of studies that examine whether the effects are positive, negative, or otherwise (Greitemyer, 2013; Markey, Markey & French, 2015). Granic et al (2014) reported that the press has added in the proliferation of common thoughts that violent video games beget violence within the players. According to Markey et al some studies demonstrate an apparent causal link between video game violence and aggressive behavior, and although there are contrary findings on other studies, policy makers and media alike have endorsed this conclusion. California, in response to the popular belief that violent videogame content causes violence within the players, enacted a law that restricted the sale of violent video games to minors, but the law was struck down as unconstitutional by the US Supreme Court in the 2011 *Brown v. Entertainment Merchant Associations* case because the court found that the law violated first amendment rights of the designers (Fisher, 2013).

Media such as movies and videos are governed by appropriateness and provide the ability for the consumer to have an idea of the content prior to consumption (Varava & Quick, 2015). However, while video games are considered media, the games offer a uniqueness not found in other types of media due to the interactivity between the player and the media (Fisher, 2013). In response to the need to rate games, the video game industry voluntarily follows the standards established by the Entertainment Software Rating Board (ESRB) in the U.S. and Canada, the British Board of Film Classification (BBFC) in the UK and the Pan European Game Information (PEGI) in Europe

(Yousafzai et al., 2014). Ferguson & Olson (2014) reviewed the ratings that were designed to provide warning of content to consumers prior to purchasing. The ratings included E which is the most nonrestrictive rating indicating approval for children six years old and up through ratings of M for mature, indicating that the content is not appropriate for audiences under 17 years old due to intense violence, blood and gore, and/or sexual content or strong language (Ferguson & Olson, 2014). The effectiveness of the ratings is not conclusive, however, and Wright, Ogbuehi, Prieto, and Donthu (2015) reported that some studies have demonstrated that the ratings do not deter the purchasing patterns and higher ratings may actually attract more people to play the title as they believe they may find more realistic graphics and content. The impact upon the design processes by the ratings are not clearly delineated and warrants further investigation (Fisher, 2013).

Social issues appear to extend beyond the perceived impact of violence in video games into other areas. Krobova, Moravec & Svelch (2015) addressed the issue of sexuality biases within video games and provides in their analysis that most games on the market are focused on males that are heterosexual and provide no way for females or those of other sexual orientations to explore the game through their point of view. Greer (2013) studied the issue of complex same-sex relationships in the videogame industry and companies such as Bioware who designed games with this option has been both praised as well as criticized by its constituents. According to Krobova et al, while some games do include the ability for the players to choose the sexual orientation of their characters, designers need to continue to do more and by doing so would be an important step for the

lesbian and gay communities. In addition to Bioware's option for addressing sexual orientation, the company also provides the means for players to play as either male or female (Lavigne, 2015). However, Lavigne adds that although this option is available, the games remain sexist as the programming continues to objectify women for the apparent benefit of attracting the heterosexual male players. This remains an area for further investigation and study (Lavigne, 2015).

Another potential area of concern for designers is the issue of race within video games as games today feature real characters with human likenesses (Dietrich, 2013). Dietrich examined this issue and found that some games allow for the creation of characters with different colors in an attempt to allow the players to reflect their choice of race, but often do not go far enough as designers often do not include the ability to change things such as facial features or other elements which could add even more depth than just changing the color tone of the avatar. In addition to the issue of race, Breuer, Kowert, & Quandt (2015) indicate that sexism appears to remain apparent in video games despite that 48% of gamers are female. Dietrich indicates that there does not appear to be any overt indications of racism when programming the games, and the findings from Breuer et al demonstrated negative correlations between sexism in the games and sexist attitudes of the players in the real world, but concludes that additional studies should be conducted in these areas.

Implications

Given the size and complexity of the video game industry, Granic et al (2014) suggest that a balanced approach is necessary to understand both the positive and

negative impacts that playing video games may have upon the players. The authors add that experiences received by the gamers (social, cognitive, and emotional) may "enhance mental health and well-being in children and adolescents" (Granic et al, 2014, p. 66). The impact upon the cognition of the gamers is examined by Unsworth et al. (2015) whose findings were contrary to some existing studies as the authors concluded that the correlation between video game play and increased cognition was weak. Although the findings in this study demonstrated a weak link, the researchers acknowledged the need for additional research and indicated that future studies should consider using a more robust set of examinees and a larger sample set (Unsworth, et al., 2015). Bejjanki et al. (2014), however, related that playing action video games has positive effects in multiple areas including increased attention span and improved cognition. In their study, Bejjanki et al found that action video game players have improved *perceptual templates* versus non-players resulting in conclusion that playing action game videos help the players develop the ability to learn better. Cheon (2015) adds that video games can impact cognition in addition to the behavior of the players but that research into this phenomenon has not been conducted extensively.

As demonstrated earlier, video game sales have continued to rise exponentially with sales of video games eclipsing those of other media often within days of release of the games (Cox, 2014). Yet, despite these findings, Cox affirmed that there are few existing studies which seek to explain why games are considered successful. In his study, Cox concluded that there were three factors that were associated with creating blockbuster games: (1) games are released by major publishers; (2) games are released on

the more popular platforms such as Playstation, Xbox, or Nintendo; and (3) the successful games are usually of a higher quality than their less successful counter parts. Park and Kim (2013) presented additional success factors of market targeting, awareness of what the gamers want in the games, and the willingness of the target market to pay for the game. These marketing factors are affected by the technology product designs of the games as indicated by Park and Kim whose study found that successful game design also consists of good graphics, animation, and sound, consistent with the findings from Cox.

Per Park and Kim (2013), there is a gap of knowledge which exists between understanding the technical aspects of a game and the perceptions that affect the viability of the game. Siemens et al (2015) add that a gap in the knowledge pertaining to video game design and the intrinsic motivations of the players to play the game exists. According to Caroux, Isbister, Le Bigot, and Vibert (2015), understanding the nature of player-video game interaction, the interactions in which the technical aspects of the video game influence the enjoyment of the player, is becoming an increasingly important area of study for the scientific community. These gaps in knowledge support the underlying need for additional examination regarding design strategies for video game designers to create successful video games (Marchand & Hennig-Thurau, 2013).

TAM and Video Game Design

As Park & Kim (2013) mentioned, some researchers use the TAM to try to predict the use, acceptance, and enjoyment of the video games. Hansen & Lee (2013) used the TAM as their framework for understanding the motivations of social network gamers (SNG) to play and to pass along recommendations of play for online social video games.

In their review of the TAM, the authors mentioned how the TAM has been extended to include intrinsic and extrinsic benefits and that these extensions help researchers to understand not only the perceived ease of use but also enjoyment (Hansen & Lee, 2013). Yoon, Duff, & Ryu (2013) reviews and extends the TAM in this manner as they explore the TAM constructs and extend them by adding constructs of perceived enjoyment which was found to have a significant relationship to the attitude towards online gaming as well as the intent to play online games. Kauer & Bruder (2013) termed their extension of the TAM the *Balanced TAM* as their model was one of the first extensions of the TAM to directly address perceived enjoyment. These studies demonstrate that the TAM is a viable framework for understanding motivations for players to accept new games and willingness to continue to play the games (Park & Kim, 2013; Hansen & Lee, 2013; Yoon, Duff, & Ryu, 2013). The implications are such that the designers should consider these motivations within their design process (Park & Kim, 2013).

Transition and Summary

Section 1 defined the IT problem and provided background for the study. The research question was presented and literature review addressed the current research in the video game industry. The literature review included a review of the conceptual framework and competing frameworks and establishes why the chosen frameworks works best for this study. The review demonstrated the need for continued research in the field of video game design and the techniques for creating successful video games.

Section 2 includes the research process in detail. The role of the researcher is defined in addition to the qualifications necessary for the participants and how they are to

be chosen for the study. This section also includes the research method and design and discusses why the chosen methods and designs are best for this study. The section concludes with a discussion of the data analysis including a list of the actual questions to be asked at the interview as well as a review of the reliability and validity of the study.

Section 3 contains a discussion of the findings from the study including how the conceptual framework is applied to the findings. This section also includes discussion on practical applications of the study and implications for social change.

Section 2: The Project

The overall goal of this project was to explore strategies used by video game designers to create successful video games in a competitive video game industry. My literary review demonstrates that the video game industry is complex, with a number of factors that affect the creation of successful video games. The review also demonstrates that little research has been performed in understanding the techniques and strategies used by the video game designers although the video game industry is the fastest growing segment within the entertainment industry (Osathanunkul, 2015). In this section, I review how I used qualitative research methods to obtain and explore data relevant to closing this research gap.

Purpose Statement

The purpose of this qualitative study was to investigate the design strategies of video game developers in North Carolina who have successfully created video games that are challenging, entertaining, and successful in the competitive video game market. In this study, I used a case study design approach with interviews of video game developers and a review of internal organizational documents to include work proposal, production schedule, quality assurance, technical, and concept documents, such as memorandums, design documents, and organizational project management documentation. The specific population for this study included video game programmers, designers, and IT project managers from one video game production company who have developed strategies that have produced successful commercial video games within the past 5 years. The geographical setting for the study was the state of North Carolina in the United States.

Researchers have demonstrated that video game play may affect cognition and influence behavior of the players (Kim et al., 2009). The completed study is expected to promote social change because, as video game programmers learn the best practices that have been successful in creating challenging action games, they will be able to create even more games that challenge the players' cognition, learning, and behavior attributes.

Role of the Researcher

In this qualitative study, I viewed my role as the primary research instrument and more specifically as an informant-centered human instrument. According to Peredaryenko and Krauss (2013), informants will be better informed to the content than information-centered researchers, that the information-centered researchers do not know what to expect from the interaction, and the researcher expects that the informant will willingly share beyond what is asked of them. I developed the interview questions, found and selected the participants, coordinated and conducted the interviews, reviewed the data, and conducted follow-ups to confirm accuracy of responses with the participants, such as recontacting the participants to clarify any vague responses or addressing any consistencies that I found after reviewing the data. My interview questions were open-ended in order to elicit sufficient detail in the responses and led to open discussion and follow-up questions based upon the responses, as suggested by Yin (2014). Lastly, as a part of my data collection process, I recorded my observations of the interviewees during the interview process. As indicated by Hawamdeh and Raigangar (2014), observing reactions such as hesitations or discomfort in responses to certain interview questions or topics could lead to additional clarifying questions used to increase the validity of the

study or generate additional themes. I did not observe any noticeable unusual behavior during responses, and the follow-up questions were due to the need to clarify responses to initial questions during the interview.

I have no practical experience in the video game development field, except as an avid video game player. I have played video games of all types since the 1980s and as an adult, I continue to play the newest releases. I have no relationship with anyone in the video game development industry. The lack of a relationship with the participants allowed me to conduct my interviews with more objectivity.

The Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979) established the standards for my study by providing the ethical principles by which I conducted my study. I also applied study principles per Mikesell, Bromley, and Khodyakov (2013), who indicated that during the study, the participants should be treated with respect and autonomy to maximize the benefits and minimize the risks to the participants and to ensure that all such risks and benefits are equally distributed among the participants.

When conducting my qualitative study, I accounted for the potential of bias on the part of the researcher. This topic has been extensively debated by scholars for years (Peredaryenko & Krauss, 2013). I recognize that I could have introduced certain bias into the study based upon my experience as a player and a parent of players of videogames. Questions in a qualitative study should be open-ended so as not to make assumptions about the thoughts of the participants (Rosenthal, 2016). The design of my study with

open-ended questions helped to ensure that the responses are those of the participants without influence from my personal thoughts.

Participants

My case for this research consisted of one video design organization who has produced a successful video game. In order to find an organization, I initially contacted multiple video game design companies within the area of Raleigh and Durham, North Carolina to ask for permission to interview employees who have worked as developers on successful video games. Participants in the study had to be video game programmers, designers, and IT project managers who developed commercial video games within the past 5 years. When I began my study, I did not have any contacts who worked as video game developers and no contact with any video game design organizations. In order to secure an organization for my study, I researched the Internet for local video game design companies. In the Triangle area, I found a number of potential organizations. The composition and sizes of the organizations varied, but most consisted of approximately 10 to 20 employees in various roles. I sent emails and completed contact forms introducing myself and asking if they would consider participating in a doctoral study. I received a positive response from one organization. I prepared an agreement with the participating employer to ensure that the employer understood that participation in the study was private, the data were protected, and the data gathering process was designed to pose minimal disruption to the workplace. This agreement letter is included as Appendix A. I did not receive any additional responses to my inquiries.

I established a working relationship with the participants by introducing myself and the purpose of my study. Prior to the study, I obtained consent via email from each participant of their willingness to participate in the study. The email consent form detailed the rights and protections afforded to the participant and is discussed fully in the forthcoming ethics section in this study. After explaining the study, I obtained a verbal confirmation from each participant of their willingness to participate. I ensured via the consent form that the participants were aware that collected data would be secured in a locked container and will be stored for a period of 5 years after which time the data will be destroyed.

Research Method and Design

I used a qualitative research method for this study and a single case study design to study the strategies used by successful video game designers. The use of the case study design helped me explore the challenges of video game development and how the designers overcame them, allowing me to develop a study that can help future video game designers to create their own successful games.

Method

Qualitative methods of research allow the examiner to perform in-depth studies of actual experiences of people involved in a particular phenomenon. This type of study gathers information aimed at understanding or explaining the context or process and provides the means of doing so through interpretative processes, which include participant interviews and observations (Bailey, 2013). Information for qualitative research can be gathered via interviews, observation, documents, focus groups, and other

methods (Stockman, 2015). Per Yilmaz (2013), qualitative studies allow the researcher to gain a more in-depth understanding of the participant and the phenomenom that is being studied. Patterson and Malpass (2015) added that qualitative research methods allow the researcher to gain a deeper understanding and more complete truth of due to the complete approach to investigation. I chose to use interviews with open-ended questions per the qualitative method to gain an in-depth understanding of the challenges associated with creating successful video games and how the social issues, market positioning, and government regulations impact the design decisions and overall process from the viewpoint of the designers. The need for me to make direct contact with the participants of the study may be considered a disadvantage for this qualitative design because it took additional time. However, I believe that this was the best method for my study as it allowed me to explore my research question in significant detail and presented with advantages over other research methods.

Prior to conducting the study, I considered using a quantitative methodology. Bentahar and Cameron (2015) stated that quantitative studies allow researchers to examine relationships between variables using scientific, statistical approaches. According to Yilmaz (2013), the quantitative findings provide researchers the ability to explain events in accordance with degrees of mathematical significances or to test the predictive abilities of hypothesis based on the findings. Christenson and Gutierrez (2016) added that quantitative studies allow the researcher to test conceptual models in addition to understanding the relationship between the variables. My study was explorative, and I sought to generate an understanding of how the process used by the designers serves to

create successful games. I used a reflective journal as described below in the discussion on confirmability to document processes and steps taken during data collection so that subsequent reviewers can duplicate the actions. Although quantitative studies do well to illustrate the relationships between the variables, the results do not explain the relationship between them, leaving the researcher with the need to perform additional research to understand the significance. For my study, identifying the significance between variables did not adequately address my research question, as I needed to explore my topic in order to gain a rich understanding of the video game process, and a qualitative approach therefore appeared most appropriate. Lastly, I used my conceptual model to frame my research.

I considered using the mixed methods approach to conduct this study as this approach combines objective findings from quantitative methods with exploratory findings from qualitative methods, allowing the researcher to take advantage of and to eliminate the weaknesses associated with each method (Buckley, 2015). Some researchers also continue to question the validity of some qualitative studies by intimating that the findings from qualitative studies need to be validated by quantifiable findings (Lub, 2015). In mixed methods analysis, researchers will either convert the quantitative findings into narrative data for interpretation or the qualitative findings into numerical data for statistical analysis (Bentahar & Cameron, 2015). This conversion allows the researcher to explain the initial findings of either method with more depth and breadth than either method alone (Prowse & Camfield, 2013). In research where it would be beneficial for the researcher to understand components of both qualitative and

quantitative information, the mixed method can help to provide a more complete picture for complex examinations (Johnson, 2015). Although there are many significant apparent advantages to using the mixed studies approach, I did not believe that this approach was appropriate for my study. The approach requires a degree of expertise in both quantitative and qualitative methods and time to conduct both types of study, and it may result in additional monetary requirements as well (Stockman, 2015). My research for this study focused on creating an in-depth understanding of the video game development process based upon the success of developers from one organization. The qualitative study method provided the rich analysis of the data without the need for adding additional time and costs associated with conducting a quantitative study necessary for the mixed method analysis. In the following section, I discuss why I chose case study as my qualitative research design.

Research Design

Of the qualitative designs widely in use, I considered ethnographic, phenomenological, and case study as the possible designs for my study. Ethnographic designs examine social elements in detail in order to understand the impact of events on people and how the people may interpret and respond to situations (Méndez & Lacasa, 2015). The ethnography methodology uses extensive empirical research that the researcher gathers by immersing himself or herself totally into the social situation that is the subject of the research (Brown, 2014). This approach presents a number of challenges, including possible extended time or prolonged engagement needed for examination purposes and observations and a requirement for the researcher to have a

deep understanding of the culture of exploration (Rashid, Caine, & Goez, 2015). My study did not require extensive knowledge regarding the culture of the designers, nor did it require in-depth knowledge regarding how video game design decisions affect the designer personally.

Phenomenological qualitative studies examine a particular phenomenon in a very detailed manner with the goal of using the participants' experiences as the basis for understanding and analyzing the event (Yüksel & Yıldırım, 2015). The focus of the phenomenological approach is on shared experiences, according to Daghan and Akkoyunlu (2014), and the basis of such is that all participants have experienced the phenomenon in question (Abawi, 2012). I did not choose this type of design because it was not my the intent to understand how shared experiences between the participants impacted video game design or how the participants were themselves impacted by the process.

Case study design also consists of an in-depth analysis of a real-world phenomenon (Yin, 2013). The phenomenon in this study was the creation of successful video games by the video game designers. I chose this approach for my study because I focused on a specific case of a successful video game creation and the associated development processes and gathered information through in-depth methods that included interviews, documents and reports, and observations in order to develop themes based upon the findings. I used a single instrumental case study versus collective (multiple) or intrinsic case study methods. Multiple case studies allow for the examination of contrasting strategies for successful video game design in addition to the ability to

provide stronger validity than a single case study design (Yin, 2014). My aim was not to contrast various design approaches but to examine the approach of a single design organization to creating successful video games.

As Rule and John (2015) surmised, there are four ways of approaching case study research in addition to choosing between single, multiple, and intrinsic types. These approaches address how the researcher may use theory during the conduct of the study. According to Rule and John, the approaches include theory of the case, theory for the case, theory from the case, and theory-case interaction. In the first approach, the researcher uses the theory to guide the development of the case study. This approach uses the theory to create the focus of the case study, to guide assumptions, and to establish limitations and delimiters (Rule & John, 2015). In the theory for the case approach, the researchers test a theory during the course of their research. The findings may lead to acceptance or rejection of the theory (Rule & John, 2015). The third approach, theory from case, is used when the researchers develop theory from the research that is conducted during the study. The final approach is a mix between the second and third approaches, as one might develop theory from the case study while also developing the case study from theory. The most appropriate approach for my study is the first approach, as I used the TAM to help guide my assumptions, limitations, and delimiters by providing the constructs for conducting my study. I did not seek to develop theory from my research nor to confirm or reject a theory as would be the result of applying the other case study design approaches. Elman, Gerring, and Mahoney (2016) added that researchers can use case studies to work backwards from an outcome to discover the cause and work

forward from a cause to reach a potential effect, but this is a decision that the researcher must make based upon the goals of the study. I sought to explore the process of creating successful video games from those involved in its creation. Given that, I looked to understand how the developers reached their successful outcome and to understand the things that they did in doing so.

Population and Sampling

I chose to use the purposive census sampling method for my qualitative study as a means of obtaining participants for my study. Gentles et al (2015) discussed how scholars have often not fully agreed upon the definition of purposive sampling resulting in ambiguities that create the necessity for researchers to be very clear of how this technique applies in their specific study. Failure to be clear about the selection process when using purposive sampling can make it difficult for readers to judge the rigor of the study (Gentles et al, 2015). Fusch and Ness (2015) states that one should have a sample size that provides thick rich data as the primary consideration. Palinkas et al (2015) adds that purposeful is used to help select resources from limited groups in order to generate information rich data. Additionally, according to Benoot et al (2016) one of the main tenets of purposeful sampling is that the method is not meant to be all inclusive of every potential type of participant. Per Benoot et al (2016), a key goal is to examine in detail a key concept, not to arrive at a specific solution. The population of my study consisted of people from one video game design organization who have worked on creating successful video games as programmers, IT project managers, and quality assurance within the past five years. Census sampling takes place when the researcher includes in the study the

entire population that fits the specified criteria (Lucas, 2014). The total size of the organization is 15 employees in various capacities; 7 of the employees fit the criteria for participating in my study. I included all members of the organization that fit the specified criteria for the study, allowing me to conduct census sampling. In order for a participant to be chosen for my project the participant must have worked on a successful video game release within the past 5 years as indicated in the participant section and been in a IT role that contributed to the overall design and decision-making for the video game project so as to reduce variability and was located here in my local area. It was preferable, but not required that they be currently involved in developing an upcoming game for release as this would imply that they have maintained a current skillset for development processes. Sample group limitations will be discussed in section three.

When choosing my sampling size, I consider the point at which the information may become redundant or the point of saturation as noted in Gentles et al (2015). According to Morse (2015), the size of the sample needed to achieve saturation depends on the phenomenon being studied, level of subjectivity in the topic, complexity of the topic, and the researcher's knowledge of the topic. As mentioned above, the total size of the population of the study consisted of 7 video game designers from a single game development company as this constituted the entire population of developers who fit the eligibility criteria for my study. Gentles et al (2015) indicates that the number of participants can vary widely depending upon the depth of information obtained from well-crafted interview questions. According to Cleary, Horsfall and Hayter (2014), the size of the sample in a qualitative study should be dependent upon the quality of the data

within the study and should be reflected in the study's findings. As such, smaller samples in qualitative research can be used as the "aim of sampling in qualitative research is to acquire information that is useful for understanding the complexity, depth, variation, or context surrounding a phenomenon (Gentles et al, 2015, p. 1782). Given that I used a census approach for sampling, I ensured data saturation by obtaining rich detailed responses from all participants. My interviews consisted of open-ended questions and the participants were encouraged to speak on their own personal experiences when developing video games. I used member checking as discussed later to help ensure that I reached data saturation from the information that I obtained during the interviews

Ethical Research

I collected data from my participants upon approval for research by the Walden University Institutional Review Board (IRB) who evaluated my proposal for research and ensured that it met the standards required for ethical protection of the participants. According to Øye, Sørensen, and Glasdam (2016), it is difficult to predict and define all possible ethical considerations when conducting qualitative research and some of the issues do not surface until the interview process begins due to the fluidity of the situation, the environment, and the possibility that some participants may not fully comprehend the consequences of participating in the study. Therefore, researchers must have broad enough guidelines and flexibility to adjust to ethical issues that may arise at the point of collection for the qualitative research (Øye et al, 2016). My research followed the ethical guidelines established by the Belmont Report per the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1979) and the

Walden University IRB. My study's IRB is 06-15-0459876. Additionally, all participants electronically signed a consent document which informed them of their rights to opt-out of the study at any given point. The consent form included information for the participant detailing why a participant was selected for study, the identity of the researcher, an explanation of the research purpose and description of the procedures, and information on any compensation for participating in the study. The consent form is discussed in more detail below.

According to Upjohn & Wells (2016), study participants must be made aware that they can withdraw consent to participate in the study at any time. As such, participants in my study were made aware via the consent form prior to collecting any information that they may withdraw from participating in the study at any time prior to and during the study without penalty by informing me of their wish or intent to do so. Any incentives for participating in the study should be made clear to the participants prior to the start of the study as a part of the informed consent process (Yip et al, 2016). The participants were made aware via the consent form that there are no incentives offered as a result of participating in this study. The National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research (1979) in the Belmont Report provides that the data which links the information to the participant who provided the information should be protected and then destroyed at the earliest moment when it is no longer needed. The consent form contained language to explain how I will safeguard the data obtained during the study by keeping it in a locked, fireproof safety box in my home office, the key to which only I possess for 5 years, which is the required time by the

Walden University IRB to protect the rights and confidentiality of the participants and how I will destroy it at that time. Only I possess the key to the locked box. Saunders, Kitzinger, & Kitzinger (2015) advocates the use of pseudonyms to create a degree of anonymity to protect certain areas such as people's names, places where they may be or reside, religious or cultural backgrounds, occupation, family types, and any other potentially identifiable area for the participant. I have assigned a pseudonym for each participant to protect their identity within the study. I also used a pseudonym for the organization and have not identified the name of the organization anywhere within the study. I will maintain the only key to the actual names of participant and organization in a password-protected document that is separate from the actual study data on a USB storage device that is also password protected. The actual study data will be stored on a second password protected USB storage device. Both USB devices will be stored in a locked container as mentioned and will be destroyed after five years.

Data Collection

Instruments

According to Yilmaz (2013), researchers are the primary data collection instruments in qualitative studies and must establish close contact with the participants and observe behavior. As such, I was the primary data collection instrument in this qualitative case study for all data collection instruments. Per Peredaryenko and Krauss (2013), understanding the topic or phenomenon from the perspective of the participant is important in qualitative studies. According to Hawamdeh and Raigangar (2014) and Anyan (2013), interviews are considered to be one of the most common means of

obtaining data for qualitative studies. My primary data collection method was in-person semi-structured interviews with the participants as described below. Morse (2015) indicates that interviewers may ask follow-up questions during the course of the interview although these questions may or may not be included during the coding process. During the live interview, I asked follow-up questions during the sessions to attempt to gain additional information or clarify points. Participants should be made aware of any incentives in a study as a part them providing consent for participating (Yip et al, 2016). Participants were made aware in advance that they could opt out of the interview at any given point in time with no repercussions as participation was voluntary and without the expectation of any rewards or other incentives.

I also requested to review company documents to include requirements, specification, quality review, and marketing as a secondary source. I submitted this request to the company's leadership at the onset of our communication. According to Yilmaz (2013), document analysis is one of the means of triangulation and contributes to a rigorous qualitative study. The documents were secured with the other raw data at the conclusion of the project for a period of five years and will be destroyed at the end of that period in order to help protect the rights of the participants of the study in accordance to the guidelines within the Belmont Report (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, 1979). Software Requirement Specification documents provide information that will guide the development of the specifications for the video games (Baek, Lee, & Lee, 2016). The quality review documents will provide insight on how well the project actually met the requirements and

other specifications of the customer (Caliz, Samaniego, & Caliz, 2016). Marketing documents may provide some background on the target video game market and how the video game may be positioned in the market by the company (Payne & Steirer, 2014). This is important insomuch as it impacts the requirements for the video games. I reviewed the documents to gather information on the video game development process as it pertained to my research question and any information that addressed topic areas defined by the interview research questions. The information contained within any documents that I received was also presumed to be accurate and complete.

Data Collection Technique

I collected information through the use of interviews with the participants. According to Jacob and Furgerson (2012), the location for interviews need to be in a place that allows for quiet conversation in a semi-private location). For this study, I conducted interviews in a time and location that was convenient for each participant that afforded the necessary privacy to maintain anonymity of the participant. In order to ensure that the participants understand that their responses will be a confidential and not directly attributable, Jacob and Fergerson (2012) recommend the use of a script read at the beginning of the interview to explain confidentiality and voluntary participation. I read aloud the consent document which outlined that participation was voluntary and explained how I would store the information for each participant under established pseudonyms so that the information would not be attributed to individual participants. The interviews were scheduled to take approximately 45 minutes per session to include time for the interviewee to ask questions of the examiner and to make any clarifying

remarks as they feel necessary. Rosenthal (2016) indicates that notetaking during the course of an interview could be distracting and should be minimized. Jacob and Furgerson (2012) adds that it is important to maintain eye contact with the participants and the interviewer should use some type of recording devices so that the interviewer is not occupied with writing and can focus attention on the participant. During the interview, I ensured that the the seats to be across from each other such that I could maintain sufficient eye contact with the interviewee. I asked the participant to sign an agreement agreeing to being recorded for the interview as used a voice-only recording device so that I was not distracted by trying to write notes while I conducted the interview. Upon agreement with the participant, I set up my audio recording device between us so that the audio level was even between the two of us. At the onset of each interview, I obtained a verbal consent from each participant to record the interview before proceeding. The recording device was not be turned off once the session began until the session ended. The only writing that I did during the interview was to make a note of any observations that I noticed during the process. All participants agreed to be recorded. I observed facial, body movement, and tone of voice in response to the questions. Upon completion of the interview, I thanked the participant for their cooperation and reiterated that I would schedule a follow-up meeting with them within seven business days to review my interpretation of their input for their review prior to me doing anything with the data. I used member checking to help validate the information. I did not be use a pilot study as a part of my data collection process.

I followed up with the participants to schedule the follow-up meeting after I transcribed and reviewed the data. Due to scheduling issues, we agreed that I would email them the interpretations and then follow-up via phone interview to discuss the findings. I did not provide a copy of the actual data analysis for member checking as the analysis is the result of a synthesis of information and, according to Morse (2015), there is no benefit to obtaining the participant's input at that point. Member checking techniques asks participants to review the findings to confirm accuracy increase the trustworthiness of data and findings (Goodell, Stage, & Cooke, 2016). I followed up with the participants via email and phone interviews as planned, to assess my interpretation of the responses during the interview. I sent each participant a copy of the interpretation and asked that they review it prior to our scheduled phone meeting. During the phone meeting, I reviewed the interpretation with each participant and asked if they had any changes to make to information or if they needed to add anything to the findings. Each participant verbally indicated that they agreed with the information in the document. Each participant followed-up with an email to me as well confirming the accuracy of the interpretation. . Given that all participants were able to fully take part in the member checking process, all of the data that I collected during my initial interviews was valid and able to be used in my study.

Data Organization Techniques

I kept track of emerging understandings throughout the research process through the use of a reflective journal. A research journal allows the researcher to record experiences in an organized and effective manner and can provide an outlet for thoughts

not recorded elsewhere in the findings (Lamb, 2013). According to Lamb (2013), using reflective writing allows the researcher the ability to generate new understanding of the research through the researcher's perception and then interpretation. Anderson (2012) adds that the journal entries provide the opportunity for synthesis of current observations, reactions, and future responses. I recorded my reflections as I journeyed through this process in multiple phases which included preparing the prospectus, preparing the proposal, collecting the data, and evaluation of the findings.

Qualitative studies involve close contact with participants who may desire anonymity in exchange for providing information (Elman, Kapiszewski, & Vinuela, 2010). Data collected during the course of a qualitative study is expected to be protected and the researcher needs to have a means of ensuring that the identity of the participants remain confidential and that information cannot be attributed to any particular respondent (Morse & Coulehan, 2015; Kaiser, 2009). I transposed each interview into respective Microsoft Word documents. Each document was named with the assigned pseudonym for the interviewee and the date of the interview. This enabled me to maintain the integrity of the data. The original data was stored on a USB flash drive that contained only the interviews. I backed up the data on a separate USB flash drive to prevent data loss due to data corruption or loss of the original flash drive. I stored the data in a metal fireproof safe to which only I have access. All data on the USB flash drives will be erased and all hard copy information will be shredded after five years.

Data Analysis Technique

Qualitative research enables the researcher to gather copious amounts of data that may need to be analyzed using techniques other than those used in quantitative studies (Lawrence & Tar, 2013). Lawrence & Tar (2013) adds that the large amounts of data can be analyzed using organization, chunking or coding, and synthesizing the information to determine what is important to be included in the final findings. Validity and reliability in qualitative studies or the rigour of such studies is based upon the credibility, dependability, confirmability, and transferability of the data (Then, Rankin, & Ali, 2014; Yilmaz, 2013). A study's rigor helps to establish the trustworthiness of the data, as discussed in following sections on reliability and validity, and includes the use of well-established data collection and analysis techniques including the use of triangulation in qualitative studies (Goodell, Stage, & Cooke, 2016). Morse (2015) provides that there are four levels or types of triangulation: data, method, investigator, and theory. Data triangulation involves the use of different types of people or groups to get multiple perspectives of the data, whereas theory triangulation involves the use of multiple theories to analyze the data (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014). According to Carter et al (2014), investigator triangulation involves using multiple researchers in the same study to provide different perspectives on the same data. I selected to use the fourth type of triangulation, that of method, because as a solo researcher, I do not have access to multiple researchers nor multiple groups to gain their perspectives. As such, the investigator and data triangulation methods are not appropriate for this study. My study focused on one study and did not provide contrasting views of

the same data using different methods and therefore did not use theory triangulation. Method triangulation involves using different means of collecting information on the same subject (Carter et al, 2014). I collected information, as mentioned earlier, using interviews and company documents and used method triangulation in this study.

I saved each transcribed interview into its own unique file and kept the transcriptions in the aforementioned secure USB drive that was stored in a secure container. I reviewed the documents provided to me by the organization to transcribe information pertinent to video game design and recorded the information into a single file to prepare for the next step in the analyzation process. I also reviewed my recorded observations and transcribed my findings into another file for the next step.

As mentioned earlier, I used the Nvivo 11 for Windows to help with the analyzing the data. The Nvivo software helps to categorize information and assists the researcher in developing themes and findings trends during the coding process (Rosenthal, 2016). It is up to the researcher to determine how to use the information and to develop conclusions and I reviewed the information accordingly. I used a content analysis technique to review the themes to review how they may align with each other and how they address my research question. According to Oliveira et al (2016) content analysis can be broken into three approaches: lexical analysis, syntactic, and thematic. My analysis focused on themes, and the frequency of codes related to the constructs within the TAM framework. I used a thematic approach for my content analysis to correlate the key themes with recent studies and my conceptual theoretical framework. I used the themes that I

identified via review of the data and through the Nvivo software that closely aligned with addressing my research question moving forward in my study.

Constructing interview questions that allowed me to create generalizations in my data was a very important part of obtaining data for the study. Yin (2013) indicates that creating such questions is important and have serious implications for the rest of the study. The use of open-ended questions that begin with "how" or "why" encourage the participants to provide responses that cover actions over time and could contribute to understanding the reasons for the results of the case-study (Yin R. , 2013). My interview questions and subsequent follow-up questions were constructed using key words such as "how" and "why" to help elicit thoughtful responses.

Reliability and Validity

Reliability

Dependability. Per Morse (2015), the concepts of reliability and validity work together to ensure that the findings are rigorous or trustworthy. Lincoln and Guba (1985) established that credibility, dependability, confirmability, and transferability for the basis for determining the rigour of qualitative research. Amankwaa (2016) added that dependability of the findings are when they can be repeated and are consistent. According to Munn et al (2014), dependablity can be established if researchers' process are suitable for addressing the research question and are consistent with the methodology, and if the process is repeatable, and well-documented. Connelly (2016) adds that audit trails or process logs help to document activities and are helpful in establishing dependability in qualitative studies. I used a reflection log to document my process so that any subsequent

reader or reviewer can understand the decision-making process in each situation and how my process remains consistent with my methodology.

I used the Nvivo 11 software to code the data that I got from the interviews. Coding allows the researcher the ability to categorize or index large amounts of data for analysis (Gläser & Laudel, 2013). Reliability is considered higher when multiple researchers can view the data and arrive at the same or similar codes according to MacPhail, Khoza, Abler, & Ranganathan (2015). This method allows the researchers to identify patterns in the data which may tie into the research question or theory used in the study. However, using this particular method of multiple coders to assess the reliability of the data requires another researcher to review the data and, as a solo researcher, I did not have access to another researcher for intercoding. The Nvivo software allows the researcher the ability to perform coding systematically based upon the source material (Oliveira et al, 2016).

The reliability of my study depended, in part, upon the willingness of the participants to provide truthful and complete responses. Ideally, the responses would be the same or similar if asked by someone else in a different study (Morse, 2015). Comfort with the process and researcher is a factor that can affect the level of honesty and openness of the participant during an interview (Isaacs, 2014). In order to encourage honest and open participation and to create a level of comfort for the interviewees, I ensured that all participants understood that all responses remained confidential, that interview responses will be stored in files which do not contain any identifying

information, and that the information will be secured on a drive to which only I have access.

Validity

Transferability. Morse (2015) endorses several strategies for ensuring validity in qualitative studies and include prolonged engagement, persistent observation, and thick, rich description; negative case analysis; peer review or debriefing; clarifying the researcher bias; member checking; external audits; and triangulation. According to Fusch et al (2017), transferrability is used in qualitative studies to help establish external validity. Per Connelly (2016) transferability, the ability to apply findings from one study to another, must be supported by the researcher through the use of rich, detailed description of the context and transparency of the analyis. The transferability of my study was enhanced by the rich description of the data during the analysis.

I employed strategies of member checking, clarifying researcher bias, and triangulation of collected data to demonstrate validity in my study. Researcher bias can occur due to the tendency for the researcher to see in the findings what he or she expects to see in the findings, potentially effecting the analysis (Morse, 2015). I indicated my researcher bias in my analysis as one who actively plays video games and is interested in understanding the effects of gaming on the players. Being open about any preconceptions that I may have regarding the design process of gaming in general contributes to the transparency necessary to increase the validity of the findings.

Credibility. I used established research methods such as member checking and triangulation to address credibility of my study. Cope (2014) indicates that credibility in

qualitative studies refers to trustworthiness of the findings and is enhanced by methods such as using multiple sources of data and triangulating the findings in addition to the use of audit journals and of avoiding researcher bias. According to Houghton et al (2013) triangulation allows the researcher to confirm findings through the use of multiple sources of data and can enhance credibility of the study. Lub (2015) adds that triangulation in concert with member checking helps to reduce possible biases and inferences which may affect the credibility of the study. I used information such as documents from the participating organization, my reflective journal, and the participant interviews to triangulate my findings.

Confirmability. Cope (2014) indicates that confirmability in a study can be established by the researcher by describing in detail how conclusions were reached and interpretations made. According to Connelly (2016), detailed notes kept by researchers help to provide a record for how the researchers conducted the study and provides a measure of objectivity as subsequent reviewers are able to review and repeat actual research steps. Moon et al (2016) adds that the finding in the study are the results of documented processes that may be replicated. I documented observational findings from interviews and the steps that I took at each part of the research process in my reflective journal to provide objective repeatable steps for subsequent reviewers. Black et al (2013) intimates that in addition to maintaining an audit trail for the process, the researchers should document the analysis process including coding. I used coding as indicated earlier to find the relationships within the data via themes and how the findings connected with the research question and documented the steps taken during the process.

Transition and Summary

Section 2 included a discussion of the methodology and design for the study and provided rationale and support for each. It was comprised of the population and reason for sample size and how the actual interviews were conducted. It also includes detailed information on how I secured the information as well as a discussion regarding the reliability and validity of the findings. Section 3 details and analyzes the actual findings from the study. This section uses the conceptual framework as a guide during the analysis. Section 3 includes implications to social change and present the limitations of the study as well as areas for potential future study. The section concludes with a reflection of the examiner's research experience.

Section 3: Application to Professional Practice and Implications for Change

Overview of Study

The purpose of this qualitative study was to investigate the design strategies of video game developers in North Carolina who have successfully created video games that are challenging, entertaining, and successful in the competitive video game market. I conducted interviews with a group of current video game developers from a video game development company in North Carolina in the United States. The organization provided several documents for inclusion in the study, and I used my reflections to understand the challenges associated with the video game development process. This section begins with a brief overview of why I studied the video game development process followed by an analysis of the findings.

Presentation of the Findings

The research question that I sought to answer was the following: What are the strategies used by successful video game developers in North Carolina for designing video games that produce challenging yet entertaining and successful video games in a competitive video game market?

My analysis of the data yielded four major themes as follows: (a) importance of the designer's role, (b) video game programming methods, (c) video game cognition challenges, and (d) impact of feedback on game development.

The findings are illustrated in tables in each theme's discussion. Each table within the theme discussions consists of four subjective columns: High, Med, Low importance, and No reference. It consists of two rows: Participants and Documents. Responses by the

participants within each theme is classified high, medium, or low based upon the level of significance given to each theme by the participants. Level of significance for each theme per documents is based upon the amount of content within the document that addresses that particular issue. If the participant or the document does not directly attribute to the theme, then the response or document was recorded in the "No reference" column.

The participants in the study either worked in or had experience in all facets of the development process. Three of the participants were currently programming engineers responsible for coding actual gameplay in the games, two were graphical artists responsible for designing all of the graphical elements of the game, one was the quality control engineer responsible for testing all aspects of the design and game, and one participant performed in the role as the project manager. Two participants also had prior experience as designers, responsible for the overall direction of the video game development from inception to publishing. All participants had previous experience creating successful video games. There were no female participants, but research questions were nongender specific and did not pose any bias in responses.

The organization provided seven documents for use in the study to provide examples of work products and procedures within the organization. The documents included two request for product documents, a pitch document used to narrow down key gameplay features, a high concept document that contained a project integrated master plan and schedule, a document that provided a sampling of external testing, and two technical documents that demonstrated integrated mechanics within the project as well as in-application purchases.

Theme 1: Importance of Designer's Role

The role of the designer as the key determinant for decision making was prevalent in my findings from the interviews with the participants and was consistent with literature prior to my data collection. The findings showed that members of the game development team interpret what the designer is trying to communicate so they can then actually create these ideas in a video game. The developers do this through various meetings during the predevelopment process, according to all team members, as well as through game design development documents (Table 1). Additionally, in many cases, participants indicated that they implemented the vision of the designer, regardless of their personal opinion of the subject matter to include opinions on amount or type of violence or adult content, and any of the key priorities within the game such as the platform or genre. While six of the seven participants believed that social issues had some impact upon the development process, all seven participants indicated that the decisions regarding the type and amount of mature content rested with the designer. Two of the participants indicated that they could provide input but ultimately deferred to the designer. When asked about balancing the use of violence in video games with creating a socially acceptable product, six of the seven participants declared that the programming of violence in the video games depends upon the context of the game and that they are fine with it so long as it fits within the context of the game or genre. One participant did mention that small development companies such as theirs had to be careful of the projects that they chose because they did not want to develp the wrong reputations with the public and that they could push back on projects before they accepted them. However, once they accepted the project as one

that fit within their culture, they would ultimately follow the designer's lead in full. Five of the documents provided by the organization contained additional insight into the design flow and decision-making processes.

Table 1

Frequency of Theme 1

Source	f high importance	f med importance	f low importance	f no reference
Participants	7	0	0	0
Documents	4	1	0	2

Note. f = frequency

One of the major features for consideration for the development team is determining which platform for which to design the game. Platforms for games include PC-based platforms such as Humble Bunny as well as PS4 and Xbox from Sony and Microsoft, respectively (Payne & Steirer, 2014). Five participants mentioned how the platform has an impact upon design decisions because different platforms cater to different audiences, and the developers need to know the audience while they are developing the game, but again, the platform decision was not made by the participants on the development team, but by the designer.

In a review of the design documents provided by the organization, I found that the participants met with the designers to gather concepts that were then put into language that the development team could interpret and then use to develop requirement documents that included everything from the number of resources needed to the time it would take to complete the development. Organization documents provided by

participants also demonstrate the need for knowing or understanding the platform as the requirements for the development team in the submitted concept documents cover Xbox, Sony (Playstation), and PC. Once the participants had an understanding of the technical requirements, the developers conferred with the designer again on the concept to ensure that they had the proper understanding of his or her ideas before moving any farther according to all participants.

While the participants agreed that the designer owns the process and all major development decisions, six of the participants also indicated that at the development level, financial security was a major consideration when working on a project. As such, for smaller development teams such as the participants in this study, it was more important to keep the project and remain financially stable than to risk losing it due to disagreeing with the designer. The findings, therefore, show that for smaller development teams, the role of the designer on a project team has significant impact upon creating successful video games and impacts everything from choice of project to how the development takes place. In support of this, one of the organizational documents demonstrated how the role of the designer is involved in every phase of the project from preproduction, through the alpha and beta phases and on to final release. Roswell et al. (2014), in their discussion of video game design, indicated that designers have the job of constructing worlds based upon stories and have to have the ability to communicate these ideas so that different people will understand them. The major takeaway from the participants is that the entire team has input into decisions regarding the content of the

gameplay, but ultimately the decision as to how the project will proceed rests in the hands of the team's designers and project leaders.

Prior to my study, the existing academic literature regarding the actual responsibilities of the members of a video game development team was limited. However, I did find that researchers agreed that the designer was a significant part of the video game development process. One issue that I found, though, was that the existing literature did not significantly distinguish between designers and developers, and the terms were often used interchangeably by researchers, as the distinction between them was not a point of emphasis. This lack of distinction can be misleading and confusing because, as Becares, Valero, and Martin (2016) demonstrated, video game development has evolved into a very complex project with highly technical roles that may include hundreds of people working several years to complete. Becares et al. added that the job of a designer is to create the world of the video game while the developer's job is to work within the boundaries established by the designer's vision. This is consistent with the data collected for my project from the participants, as another programmer stated that the developers have little to do with the decision-making process even on their team and that the designers are responsible for direction in all major areas. One participant added that the role of the developer was to point out things that may appear out of line to the designer, but ultimately the decision regarding any issues was up to the designer. The participants clearly view developers and designers as distinct roles, with designers as leaders on their projects. Given that lack of distinction, in my earlier review, I found that the designer was key to all decision-making areas, such as when determining gameplay

elements (Ahmad et al., 2015), difficulty levels, as noted by Lindenroth (2015) and Eichenbaum et al. (2014), and in game content, as emphasized by Rowsell et al, (2014). This is very consistent with information provided by the participants. One participant cited an instance when the majority of the development team wanted to add female soldiers to a military game because the military includes females, albeit at the time of development, not in combat roles. However, although the team wanted to do it, the designer overruled it because it was not realistic in his vision. Another participant stated that his role as a developer on the team did not include him providing any input on a project's direction. The organizational documents provided by the participants add little to this discussion, but one document did demonstrate the role of the designer in the process as a leader and illustrated how the design process encapsulates the entire development process.

Prior literature also demonstrated that social issues such as violence, adult content, race, and gender equality has a significant impact upon the how people in society view video games, but, again, there was not a substantial number of academic studies regarding how developers dealt with these issues during the creation or design process. For example, according to Markey et al (2015), a number of researchers set out to prove or disprove a correlation between violence in video games, or examined, as illustrated by Fox and Tang (2014), how racisim and sexism not only exist in games, but how these problem areas in society manifest within the games. However, as Bartle (2015) demonstrated, although multiple studies exist that attempt to demonstrate the correlations, those the studies do not carry much weight with the professionals in the game

development industry. This is somewhat consistent with the findings in my study, as multiple participants indicated that social issues do have an impact upon the design of the video game, but that these issues do not result in significant changes to what they do. One developer stated that as developers, they are aware of the issues, but often the content decision is out of their hands. Another developer indicated that social issues are significant but only have a minimal impact upon what they do. Accordingly, while designers and developers are acutely aware of the studies and the perceptions, market demands that demonstrate that highly violent games such as Grand Theft Auto generate billions in revenue (Prieger & Hu, 2012) take precedence. The choice of genre is an important mention here as it may have a direct impact upon the level of acceptable mature content. Current literature demonstrated that video games are classified into multiple genres based upon several factors, including gameplay mechanics, tasks or goals within the games, and gameplay rules or boundaries (Dobrowolski, Hanusz, Sobczyk, Skorto, & Wiatrow, 2014). Sevin and DeCamp (2016) added that many studies that examine the effects of video game violence have focused on a very limited genre, such as first person shooter games. All of the respondents indicated that the choice of genre impacted game design and development, with several indicating that the decision of the genre rested with the designer. The documents provided by the organization demonstrated that their focus has been on tactical shooter role-playing games games and cartoon or animated games. As such, these kinds of projects is where their expertise lies, and this, more than consideration of mature content, plays a significant role in their decisions regarding which projects to accept for future work.

Existing literature was consistent with my study's findings regarding choosing a platform, although the literature again did not delineate between the designer and developer. Parkkila, Järvi, Hynninen, Ikonen, and Porras (2016) indicated that deciding which platform to develop for is one of the toughest decisions for the video development team because of the lack of the ability to share gameplay across platforms. Consequently, designing for different platforms results not only in the need for additional programming time, but additional testing time as well as each platform may have different requirements for the same functionality. One participant stated that some of the larger platforms such as Sony (Playstation) and Microsoft (Xbox) have rigorous quality control processes for assessing whether the game meets the technical requirements of their system, and if it does not, it will not get published, and the team has to start over again from a certain development point. Payne and Steirer (2014) added that players of the same game title may have very different experiences when playing on different platforms. One participant added that it was important that the technical team understood the platforms for which the game was designed to ensure that the game played the same on each of the platforms. Five of the participants mentioned the need to understand and adjust for the platform due to need for specialized design, testing, and even feedback particular to each platform.

I found in my review of recent literature that the video game designer is the key decision-maker for setting the overall direction of the video game's development. The designer and the processes used by the designers during video game development requires decision-making ability and vision and is central to the development process (Marcelo & Davi, 2017). One participant emphasized this point, stating that it was their

job as developers to implement the vision of the designer. These attributes are the same as those for successful project managers, as discussed by Novo, Landis, and Haley (2017). According to Novo et al., project managers must provide strong leadership to create a productive and successful team environment. Video game designers have similar goals as they must also create an environment that fosters creativity within the scope of their vision. Schmalz, Finn, and Taylor (2014) indicated that the producer has the primary role as project manager and that in smaller projects or companies, this person will likely fill several roles, including that of the designer. This is consistent with my study in that one person filled both roles and was simply referred to as the designer by the participants. Sutoyo, Winata, Oliviani, and Supriyadi (2015) added that it is ultimately the responsibility of the designer to make decisions regarding game play within the game. The degree to which the designer is effective can contribute to success of the game.

Findings also demonstrated, however, that there continues to be a scarcity of information directly addressing how video game design and development are impacted by social issues and choice of genre. Although the number of studies regarding effects of video game content continue grow, as noted by DeCamp (2017), a practical examination of how video game developers have responded to the available information is absent. DeCamp added that nearly all of the hundreds of studies examining social issues in video games have been focused on the outcome of playing the video games. Ahmad et al. (2017) stated that in prelaunch, the development teams examine issues that matter to the video game developers, but in that phase, they only include external factors of market trends and genre demands with internal factors of feedback from customers after launch,

with no indication of influences due to reported possible social issues or effects. The organizational documents provided by the organization provide no input into this discussion regarding social issues. However, the lack of consideration of the issues by the development team is consistent with feedback from the participants in the study as well. One participant stated that these issues are not something that typically come up during development. Another participant added that social issues have not had a big impact on what they have done and that things ultimately come down to what the designers and publishers want. Six of the participants indicated that while these issues are known, they feel comfortable having them as a part of the game so long as content fits within the scope of the game and are not there for shock value.

The TAM provides that an important element for technology success is the behavioral intention to use the technology by the consumer. The TAM does not fully frame the findings of Theme 1, as the conceptual frame does not address the leadership structure within a technical development team and the decision-making process therein. The participants' focus on a central point for primary decision-making when it comes to vision and concept also does not directly correspond to the constructs of the TAM. The extension of the framework by Venkatesh added detailed constructs as inputs into the perceived usefulness and perceived ease of use of the TAM. One of the anchor constructs was computer playfulness and an adjustment construct was perceived enjoyment. Fala (2014) described perceived enjoyment as the extent to which a person perceives enjoyment from use of a system regardless of system performance and computer playfulness as the degree of cognitive spontaneity of microcomputer interactions. Park et

al (2014) indicates that perceived enjoyment is widely reviewed by other studies as one of the most significant determinants for a person's intent to use a system.Venkatesh (2000) demonstrates that when the level of computer playfulness increases, the perception of effort is lowered and the likelihood that the user will continue to use the system increases. Venkatesh adds, when writing about system designers, that the designers normally try to build systems that are easy to use while providing functionality for the users. This is consistent with Rowsell et al (2014) who intimate that the goal of the designer is demonstrated to be one that is focused on creating a product that is enjoyable and playable by the gamers. This is also consistent with the findings from the participants in my study which demonstrate that the developers rely upon the decisions and leadership of the designer for vision in creating a fun concept. Hamari and Keronen (2017) indicate in their study of TAM and video games that there is a strong relationship between attitude and playing intention in both hedonic and utilitarian video games. The goals as voiced by the all participants in this study focused on how well the game met the requirements of the designer and how it ultimately affected the attitudes of the players and their desire to play or replay the games. The actions of the designer are indeed framed by TAM3 as perceived enjoyment and computer playfulness both affect the perceived ease of use which in-turn affects the behavioral intention use.

Theme 2: Development Process Is Well-Defined

The second theme that emerged in my research is that the developers follow a defined development process when creating their games. Table 2 lists the frequency and

significance placed upon the software development process as described by the participants and illustrated within the provided organization documents. The process begins with gathering requirements information from the publisher or designer who hires them. This may include securing funding and determining the type of game. Four of the participants refer to this as the preproduction phase in their interviews and is consistent with the SDLC in that they are gathering requirements, determining scope of the game, resource needs to include number of programmers, graphic design artists, costs, and project scheduling. This phase is indicated by four participants as important because it sets the direction and for the video game production as due to the key decisions made during this phase. One participant stated that they may spend months in this phase alone depending upon the scope or size of the video game. The developers then move into the production phase and, according to one of the participants, this is the phase where the developers spends most of their time. It is in this phase, termed the alpha phase by two of the participants, where the developers makes game assets and iterates project development, moving from simple to complex code. Two participants further indicated that it is during this phase that the core functionality is created. Finding errors or just testing for the level of fun in the game is also a vital part of the process. Testing was the most mentioned activity by all participants and considered the most vital part for success because a video game's success depends heavily upon it being not only fun, but bug-free for the players. A major characteristic of the development process mentioned by all participants as well is that the process is extremely iterative in nature. The design and proposal documents received from organization demonstrated this iterative process as

they illustrated how the development process cycled to previous tasks until the current task met the appropriate standards.

Table 2

Frequency of Theme 2

Source	f high importance	f med importance	f low importance	f no reference
Participants	7	0	0	0
Documents	6	0	0	1

Note. f = frequency

Existing literature is consistent with the findings from the participants in my study regarding the use of software design processes for video game development. Software development and design is defined extensively by many researchers and an examination of the pros and cons of different methodologies as such is beyond the scope of this paper. It is important, however, to define the key methodologies that appear to represent the findings from the interviews. Baseer et al (2015) presents a study of the software development life-cycle (SDLC) and it includes five key phases: requirements gathering, design, development, testing, and deployment. One of the primary means of software development over the years has been the waterfall method in which the development takes place in clealy defined stages with established milestones and then it progresses from one phase to the next once those milestones are achieved (Baseer et al, 2015). Politowski et al (2016) states that the video game industry has adopted regular software development techniques and iteration characteristic in agile programming. They add that

video game development can be classified into four categories: waterfall, iterative, hybrid, or ad-hoc (Politowski et al, 2016). In this case study, all of the participants described a similar and very iterative process taken when developing their games that was consistent with the agile programming method described by Pratama Wirya et al (2016) who described agile programming as a process that may jump from latter stages of development back to the design stage, if necessary, depending on the feedback from QA, external testers, or members of the program team. Pratama Wirya et al added that the video game development process is not a linear process because so much of what the developers do depends upon the feedback that they get from users (players).

An important part of the feedback within the development process comes during testing which is identified in the existing literature as an integral part of software development (Deak, Stalhane, & Sindre, 2016). All of the participants agreed that this feedback was essential to their work and their success because their success ultimately depended upon it. The participants indicated that they consistently tested every part of the game as it was developed, and did not wait for one phase to be completed before testing what was done. One participant emphasized this point when he said that anytime there was a testable element, it was tested immediately. The planning documents submitted by the organization demonstrate how the developers emphasize testing and allots a significant amount of time for code, gameplay, and optimization reviews. In a production schedule breakdown for one project, the organization includes this process in every step from design through programming and the creation of the user-interface. This important part of the development process is not without challenges. Zachariah (2015) pointed out

that software testing is a vital and costly component in the software development process, but can be elusive in that even thorough testing may not be enough to catch all of the problems. This is very consistent with the findings from the study. One participant emphasized, no game is truly ever complete because there is always something that needs to be done and something that the developers did not catch. He clarifies this point further by saying that there are what the developers call "edge" cases where the player may do something totally unexpected within the game, creating new possible scenarios not accounted for by the code, but catching all of these cases during testing is difficult if not impossible. Issues found during testing can result in simple changes that address specific issues or in more complex changes which can result in the need to regress to an earlier phase, including back to concept or design, although one member indicated that this does not happen too often.

Additional literature found since my data collection for my study was also consistent with prior literature and with the findings within the study. Garcia et al (2017) described the process of creating video games as very iterative and indicated that an agile approach to creating video games and software that uses gamification concepts as most appropriate. Ahmad et al (2017) added that the agile programming method has become popular in video game development and allows for immediate input during all phases of development and quick changes. However, Ahmad et al also indicated that the agile method can lead to longer development times when the end-goal is not well-defined. This is not an issue raised by the participants nor documentation in my study. On the contrary, the documents outline clear project goals as a part of the process. One participant adds

that it is important to understand the scope ahead of time of what they are doing to ensure that the project can be completed by the team. Two other participants indicate that it is important to understand the scope as it impacts project decisions and finances. Testing of the games remains a significant development area within the current literature as well. Becares et al (2017) discussed how the nature of testing video games has become a very complex and expensive part of the software and game development cycle. This is consistent with the organizational documentation which demonstrates a clearly defined role for testing and QA that spans across the entire length of the project and with costs for the tester that equal those of the programmers. Nidagundi and Novickis (2017) added that testing can help to identify problems early and this is important because the longer a problem goes unfixed within the process, the higher the cost of fixing it when it is finally identified. One participant expressed this thought exactly indicating that this was the reason why they performed testing each time there was any element such as a character, an action by a character, a new map, etc. was added to the game or changed.

This theme appears aligned with the technology acceptance model. The findings support that the participants in this study are motivated to produce the best product possible in order to keep costs low by avoiding significant bugs or delays while producing a fun game that is well-accepted by the gaming community. The concept of using structured programming techniques and extensive testing is in direct alignment with ensuring that the final product has a perceived ease of use. This has a direct positive impact upon the attitude of the users towards using the technology (Davis, 1985). The TAM3 would also apply well here as well-structured programming can help to decrease

the anxiety one may experience when playing the games as the experience would be better because the user would have reduced fear of the game crashing due to bugs. Reduction of computer anxiety is conversely related to perceived ease of use and consequently intent to play (Venkatesh, 2000). Every developer was consistent in the thought that they are looking for the "fun in the game" on top of everything in an effort to ensure that the players have a great experience and will return to play future games.

Theme 3: Cognition Is Challenged, But Not as a Goal

The third theme that I found in my study is that the participants in my study indicate that they try to ensure that the game provides proper cognition challenges for the players, but that this is not a major point of development for them. When asked what processes the developers follow when designing a game to ensure that the game challenges the cognition of the players, all seven participants acknowledged that games have cognition challenges with five of them providing responses that indicated that cognition plays an important role in developing games. Two of the participants indicated that providing cognition challenges was more of a design-level item with one of them indicating that he provided very little input into this part of the process, if any (Table 3). The approach to providing the cognition challenges and assessing the success of them varied with the participants. One participant stated that they challenged the cognition of the players by offering in-game choices that require the player to think about how to proceed. Two participants indicated that they tried to ensure that the puzzles within the game were challenging with one stating that they wanted to make the initial puzzles very

hard and then, based upon feedback, adjust the level of difficulty. One participant indicated that they wanted to ensure that the puzzles leveled as the game progressed, meaning that they increased in difficulty as the player continued through the game. The organization documents contributed little to this theme. One design document demonstrated how the team works to develop challenges that get progressively more difficult as the game continues. Another document demonstrated how challenges within the game contributed to the overall enjoyment of playing the game.

Table 3

Frequency of Theme 3

Source	f high importance	f med importance	f low importance	f no reference
Participants	5	1	1	
Documents	0	2	2	3

Note. f= frequency

Existing literature is consistent with information provided by the participants, but there is not a significant number of studies which examine how the developers work to include cognitive challenges in their games. The scarcity of findings is consistent with the participants who indicate that this is not a major focus for them. There exists a substantial number of studies which examine the effects of the games upon the cognition of players and how the existing video games go about creating some of the cognitive challenges through puzzles and gameplay flow. Per Pato and Delgado-Mata (2013), flow in a game can be defined as that state in which a player plays a game that is challenging enough to push the player to his or her limits by presenting a clear goal and providing feedback

while playing, but not so much so that the player fails and stops playing the game entirely. This concept is consistent with Jacob, Clua, and de Oliveira (2017) who added that one of the challenges for developers is to create a game that has a balance between being challenging and keeping the interest of the players, but not so easy that it becomes boring for good players that they quit and not so hard that others quit and not return. This is consistent with the thoughts of three of the participants. Participant responses differed slightly regarding creating the flow as five of the participants expressed that they tried to create games that started easy and then progressed in difficulty while another stated that they tried to create games that were as hard as possible initially, but then adjusted back on the level of difficulty based upon user observations and gameplay. This concept is referred to in some literature as dynamic difficulty adjustment (DDA) and it is a design technique which allows the game to adjust play based upon the skill level and strategy used by the player during the actual gameplay (Sutoyo, Winata, Oliviani, & Supriyadi, 2015). The concept documents provided by the organization supported this type of development as well as they describe how the game increases in difficulty as the player progresses through the games. Another way of challenging cognition mentioned by one participant was to allow the player the ability to make real decisions within the game that affected the outcome and direction of the game. Lucas (2015) stated that past video games were static in that there was little that the player could do to effect the actual story, if there was one, within the game. Now, players are an interactive part of the game, and can affect the story, outcome, and progression (Lucas, 2015). In this manner, the player has the opportunity to solve puzzles uniquely and to create solutions the may have been

overlooked by other players. One example given by a participant to illustrate this point was in a game that the developers created wherein the object of the game was for an enormous animal to sneak out of a room of other people and animals without being detected. Most of the players attempted various time-consuming stealth approaches. However, one innovative player picked up a pot, covered up the obstacle to getting out the room, walked over it and dropped into the end of the game. This unplanned solution highlights a point made by four of the participant on this matter: feedback from actual players during the development process can help the developers determine if the tasks or puzzles appropriately challenge the players.

Literature found since the onset of my study is consistent with the prior literature and participant findings, but an extensive search of current literature again demonstrated limited research regarding how developers work to include cognitive tasks within their games. The creation of video and digital games is a relatively new and understudied field, as such, research continues on how to create frameworks that govern the creation of successful games (Duarto & Battaiola, 2017). Although they do not discuss the process of how developers address creating cognition challenges, Ahmad et al (2017) discusses frameworks for designing successful video games and provides a comprehensive examination of the tasks it takes to create a successful video game. Morschheeuser et al (2017) extends the discussion by stating that flow in gaming is important, adding that it is difficult, but important for designers to create games that provide easy challenges to engage the gamer and then progress to more difficult challenges as the game progresses to keep the gamers engaged. As mentioned earlier, flow is important, according to the

participants. One participant added that the team used spreadsheets to track how long it took players to accomplish certain challenges and if it the findings did not match expectations, then the team would make adjustments as necessary to ensure that they created the proper level of challenge to maintain the flow. Adachi & Willoughby (2017) add to this that video games often feature more challenging tasks as the players proceed through the game, possibly enhancing skills and self-confidence. The primary aim, according to the participants is to create a fun game. One participant stated that the puzzles that they add can be very challenging, but are always super fun, and that is the point.

Although the effect of video games upon the cognition of the players is well-studied by past and present literature, academic literature regarding frameworks used by developers when addressing cognition is very limited. This is consistent with the input from the participants in my study who indicate that this is not an area of focus or concern for them. The main concern for the participants when programming cognition challenges is to ensure that they have flow such that the players continue to play the game through to completion. The TAM3 again appears to provide an appropriate framework for this theme with the focus on the perceived enjoyment of the game more than any other area as affecting the behavioral intention to continue to play the game. Perceived enjoyment has a positive correlation to perceived ease of use and subsequently behavioral intention to use (Venkatesh, 2000). Additionally, the concept of flow as discussed by participants and within the literature is vital for this theme because, if properly programmed, the game will ease the player into more difficult challenges as the game progresses. This results in

reduced levels of anxiety when playing the game and subsequently greater intent to complete the game. A notable caveat to this is that there are some games that are intentionally designed to be extremely difficult and to create a high level of anxiety, but still have players who play the game to completion. Players play the game "Dark Souls" specifically for the high levels of anxiety associated with the games excessively high level of difficulty (van Nuenen, 2016). Games such as this challenge the framework until one considers that players play the game with intent of beating a game notorious for its level of difficulty (van Nuenen, 2016). One participant indicated that when designing challenges that they did not want to make the game obnoxiously hard such as in "Dark Souls", unless that is the games selling point as it is for that franchise. With consideration of this ananomaly, the TAM3 appears to appropriately frame this theme.

Theme 4: Feedback Is Essential for Developing Successful Games

Feedback to the development team is essential when attempting to create a successful game. All of the participants in the study indicated that this was a critical part of their process as noted in Table 4. The developers attempt to obtain feedback as early as possible from a variety of sources. Six of the seven participants indicated that external testing was a major source of feedback for the developers. This was mentioned in earlier sections, but it is relevant here as well, because it is this feedback that drives many of the decisions of the game development from design through production and is very closely related to another important source of feedback: social reviews. Six of seven participants indicated that how the game is perceived through social feedback mechanisms such as social media and other social reviews drive ongoing and future development and can

have a significant impact upon the overall success of failure of a game, or at a very minimum, the perception of such. Four of the participants indicated that critical reviews played an important part in determining the overall success of the game. In particular, these participants mention Metacritic as the standard critical review for the games. Metacritic is an organization whose purpose is to aggregate critical reviews of games from multiple critical sources into one score so that the public has a basis for understanding the perceived quality of the video game (Lee & Heeter, 2012). A review of the submitted organizational documents do not support that they aim for higher metascores, but instead, in proposal documents, emphasize the quality of the game and all associated elements in an attempt to make a fun game as the primary goal. One document demonstrates how the team collects feedback from external sources while another provides a practical application of the feedback process. QA is also indicated in the organization documents as an important part of the feedback process and the project schedules reflect processes and time built into schedule to obtain feedback from QA as well as external testers.

Table 4

Frequency of Theme 4

Source	f high importance	f med importance	f low importance	f no reference
Participants	7	0	0	0
Documents	3	0	0	4

Note. f = frequency

Prior literature demonstrates the essential function of feedback into the video game development process. According to Situmeang, Gemser, Wijnberg, and Leenders (2016), performance reviews of video games can influence the overall direction that a video game company takes when considering to remain in the current market or genre, or if to expand to new markets or genres. Marchand and Henning-Thurau (2013) contribute that video game producers have multiple means of receiving feedback including direct feedback and feedback through outlets such as social media. These findings are consistent with information provided by the participants in the study as six of the seven participants indicated that they receive feedback from multiple sources and, depending on when the feedback is received, will use it to make changes in current or future games. Additionally, Scott (2013) indicates that social media outlets such as YouTube, Twitter, and Amazon, allow users to post reviews and to interact with each other. These outlets have millions of users who share opinions on everything, including video games. According to the participants in my study, feedback from these venues can make or break a game very quickly because so much of what they do depend upon word of mouth and positive feedback. Feedback is also received in terms of sales. As Situmeang et al intimated, sales can have an effect upon the behavior of the organization as negative sales may increase risks taken by the team when determining the direction of current or future projects. Two participants indicated, however, that while the object of the publisher is to make sales, the developers often view their success through the lens of the players and their actual enjoyment of the game. One participant said that it sometimes happens where games will sell a lot and still be viewed by the public as a failure, because the game did

not deliver on its promises, but sold well due to great marketing. By contrast, he said that the opposite is also true in that some games won't sell well because of poor marketing or positioning but get outstanding reviews by the users. Schmalz et al (2014) agreed with this adding that the fun-in-the-game is sought after by the developers and is seen as key measurement for success. Critical reviews play a part as well and four participants indicate that the better a game is critically reviewed, the greater the perception of the quality and ultimately success of the game. This is not necessarily always the case, however, as there is some question regarding the validity of Metacritic scores. In a study by Greenwood-Ericksen et al (2013), the researchers found a high correlation between higher metascores and sales; however, there were a number of factors that bring into question the validity of the relationships, including no requirement of the reviewers to disclose biases and other factors which may affect their scores. As one participant explained, sometimes critical reviews do not reflect the feeling of the players, especially those in certain genres or dedicated fan-bases.

Current literature findings provide consistent information with prior literature and the information from the participants. Per Ahmad et al (2017), feedback is important at every stage during the video game development process. Participants in the study agree as six participants indicated that they constantly sought internal or external feedback whenever possible. Duarte and Battaiola (2017) demonstrated how feedback from the players have a direct impact upon the development process in their discussion of their proposed game design model, the modified Mechanics, Dynamics, and Aesthetics (MDA) model. The interconnectivity of games presents with an interesting and ongoing

issue that developers must consider when creating video games. Video games are no longer just one player against the game. Instead, there is a growing trend of online social gaming that links players for competive as well as co-op play (Rapp, 2017). Three of the participants talked specifically about how social media including applications such as Facebook, Twitter, and Twitch are valuable for them receiving feedback after the release of the game and how fast reviews (good or bad) spread through social media. Finally, Ahmad et al (2017) added that the network effect can help or doom a game and is vital for those smaller development organizations as they have the opportunity to get the word out to a vast number of people using social media platforms and other social outlets such as gaming conferences and expos. This again is consistent with information from the participants who indicate that the team will go to lengths to get the feedback as early and as often as possible. Three of the participants recount a time when they used students from a community college to test their games. Two of the participants mentioned how they observe players at conventions as they play their games and one participant mentioned that they found external testers through Craigslist. The important thing, as mentioned by all participants, is to get external testing or feedback from someone not familiar with the game play. The developers collect this information and then use it to make improvements either during production such as when the developers release a beta version of the game for play by a select group of players, or post-production when the developers get feedback from the community at large. The organization documents provide support for these findings as they demonstrate how the organization plans and

executes receiving feedback as well as how it incorporates it into the development process.

The findings in this study demonstrate how the constructs associated with TAM and variations of TAM directly influence the decision-making process for the designers and the development team. As Park et al (2014) indicated, the TAM emphasizes the use of two external variables for predicting the use of technology: perceived ease of use and perceived usefulness. Giannakos (2013) stated that TAM related theories have been used when predicting game usage, although most of the studies introduce new variables when predicting game acceptance. This is consistent with the development of the aforementioned TAM3 model which extends the TAM by adding constructs for entertainment via perceived enjoyment and computer playfulness. As viewed through the lens of the conceptual TAM framework, the importance of creating a product that is both fun and bug-free is paramont to increasing a player's intention to use or play the game. The developers consistently emphasize the importance of fun games that meet user expectation and are error or bug free in this theme. As the developers indicate, feedback on how well the game is received determines what changes they may need to make to a game's ongoing development as well as future directions of video game development projects. This is affirmed in the documents supplied by the organization as well which demonstrate how the team fully implements both alpha and beta testing as well as additional QA and external testing of the game for errors, game-flow on various platforms, and playability.

Applications to Professional Practice

The challenges associated with creating successful video games in a competitive market have increased over the years and development teams are finding it difficult to create games that endure. As mentioned earlier, very few games achieve financial or critical success. I set out to research strategies that a successful development team uses to overcome these challenges by meeting with developers who have reached the goals of creating successful games.

Video games have permeated an enormous number of areas within the daily lives of people, regardless of whether or not they actually play the games themselves. The multibillion dollar video game industry continues to grow at high rate and creating successful video games to compete in this market takes significant resources, money, and time. Smaller organizations without the resources or distribution channels have higher difficulties finding success in getting their games to the players (Payne, 2014). Payne added that development teams need sound design strategies that account for a growing and changing player-base in a rapidly changing industy in order to be successful. It is essential for any organization, large or small, to employ sound development strategies if they aim to not only compete in the market, but to create a game that may impact the very direction of an influential area of our society.

The ability for small teams to create successful video games can be a significant challenge and my study's findings may be used to create a high-level roadmap for these ventures. As new developers enter into the video game industry, my findings demonstrate that if they want to be successful, they should align themselves with a video game

designer who already has a history of developing video games and can provide direction given the low success rate for smaller video game development teams. The participants in my study were on a small team consisting of seven, but were a part of efforts led by many designers and publishers. This allowed the developers to focus primarily on producing the code and graphics for the game without necessarily worrying about high-level decision-making and the publishing aspects once given direction from their leadership.

A closely-related finding for consideration that came from my research is that the development team is likely not to have the final approval for their video game before it is published. As mentioned earlier, publishers often ensure that the games meet their internal standards prior to publishing the games. This is especially true of publishers who own platforms such as Xbox and Playstation. Developers must make adjustments to their code and repeat the process until the game meets the standards, or the game will not make it to market. Conforming to the standards of the larger publishers helped the team ensure that their games were on the most popular platforms such as Playstation and Xbox, increasing the chance for financial success.

The findings are significant because they demonstrate some strategies that a small team can use to create successful video games. The developers outline strategies to approaching the design of the games, the major influences for the decision-making process, as well has how they obtain feedback regarding their level of success. The study's findings are supported by current literature on game development as well as the documents supplied by the organization which provide clear demonstrations of the practices spoken of by the participants in action. The participants who provided the data

for this study are members of an organization that is growing rapidly as they have recently secured new projects and is moving into a larger facility to accommodate the need for additional programmers, team members, and supplies. The information that they provided here can help other small development companies understand the relationship between the designers and the development team, how different facets of a development team work together, the importance of following a defined process, and the importance of incorporating feedback at all levels during the process.

Implications for Social Change

There exists a significant amount of information regarding the impact of video games on society. A substantial number of the studies focus on the impact that violence and other adult content has on the behavior of its players. In addition to that, a common topic is whether games have an impact (positively or negatively) upon the cognitive abilties of the players. This study does not directly address these topics as a primary focus, but the findings demonstrate some insight into the decision-making process that affects how the developers may approach these subjects.

One of the outcomes of the study is an understanding that the technical development team which consists of all developers who work on inputing or testing the code of the game takes its direction from a leader, normally a designer. The findings demonstrated that although the participants had some input into the direction of the team, the decision-making was not found to be based necessarily upon consensus. Once given direction from the designer, the developers focus on meeting the primary goal of making a fun game, and not on making socially-based decisions. The social implication of this is

that although there are numerous studies on both sides of the video game violence debate, successful video game developers typically focus more on creating fun games that attract players in their genre, rather than on how much violence is in the game. The developers rely upon rating systems such as those by the ESRB to provide ratings for the public. There is no evidence found in my research that public opinion or studies on video game violence have a significant impact on the content or gameplay, or that the developers use a moral compass when developing the video game. As such, although there are studies and beliefs by some that video games impact the behaviors of their players, developers care more about creating that fun experience than catering to any one school of thought. Consequently, although the motives of the video game developers are to create fun and entertaining games, so long as the market demands violent and socially questionable games such as Grand Theft Auto (one of the best selling of all times) developers will continue to produce content that caters to those players. Developers are paid for their work by publishers of the game, and these entities are indeed driven by profit. This finding is important to parents and anyone concerned with video game content. The focus for change needs to be market-driven, and not directed towards the technical development team. If the players stop buying those types of games, then less people will develop them. However, given the recent trends (GTA selling a billion dollars worth in games), this is unlikely to change anytime soon.

One point that emerged during my interviews with the participants is that the developers emphasize that they are aware of the violence and other adult content in the games, but that they are fine with doing it so long as it is within the context of the game.

They do not program violence just for the sake of sensationalism or just being violent. This study helps to provide a focus for understanding the source of the content and where concerns regarding this type of content should be directed. Further discussion of this topic is beyond the scope of my study as I explain in my section on recommendations for future studies.

Recommendations for Action

The primary stakeholders for my study include future video game developers and and those who provide instruction and guidance for the development of the video games. It is important that the future developers understand that the video game industry is composed of companies of all sizes, ranging from the solo developer to large organizations who employ thousands of people. As my study's findings suggest, unless the developers are working solo, they normally work under the direction of a designer with some oversight by a publisher. This relationship may have grown out of necessity due to what it takes to achieve financial success within the industry. The video game development market is an industry with natural barriers to entry which include development costs which can be very high and potentially low profit for the finished or published game (Prieger & Hu, 2012). Small development companies are termed "indie" developers and it is rare for a solo designer to find success as only a small percent of games actually generate a profit after they reach the market (Parkkila et al, 2016). My study's findings demonstrate that the successful developers, are aware of and understand the relationships between the three areas (designer, developer, publisher) and work to ensure that they meet the goals of the designer and the standards of the publisher. My

findings also demonstrate, though, that many developers consider finances as but one factor when assessing the success of their games as video game developers create video games that they hope are fun for gamers first with a consideration for profits as secondary goals.

It is also important at this point to expand upon the relationship that the developers must have with publishers as mentioned in themes 3 and 4. The publishers of the video game include larger companies such as Sony, Microsoft, and Electronic Arts and literally hundreds of smaller companies. These companies ultimately determine when the games are ready to go to market based upon a number of factors including, but not limited to, internal testing, market readiness, financial projections. If a publisher determines that a game does not meet its internal standards, then it will not publish the game. It is up to the development team to meet the standards or risk failure as the project will likely not make it to market. As noted in the findings from this study, much of the decision-making for the project is performed by the designers and not the developers of the video game. It is therefore important that the developers align themselves with experienced designers who understand requirements of the publishers so that the developers can maintain their focus on producing fun games that, when it meets the designer's standards, should meet the publisher's standards as well. The relationship between the publishers and the development team (including the designer) is complicated by legal issues as noted by Prieger and Hu (2012), and extends beyond the context of this research. It is important to note, however, that video games must be played on some type of platform, and the larger platforms are owned by video game publishers.

In order to reach potential new developers and those who prepare them, my recommendation for reaching these groups includes sending a notice to the heads of multimedia departments that provide instruction for video game developers at local colleges informing them of my study's completion and where they can obtain a copy. I will provide them with a one to two-page summary of the study along with information on how to obtain a copy of the full study should they want to view it**.** In addition, I will coordinate with the small business association here in Raleigh, North Carolina to offer to provide free learning seminars for small video game development companies and independent designers and developers with follow-up training for anyone interested in receiving it afterwards.

Recommendations for Further Research

The primary focus of my study was to identify the strategies used by successful video game developers who have created video games that are challenging and entertaining. This is a technical qualitative study which focused on gathering input from members of a small video game development team. One of the key findings was that the developers take direction from a designer with some oversight provided by a publisher. It is the designer and/or publisher who determines overall direction of the game including the amount of violence and mature content in the game. Because of that, most of the developers indicated in their interviews that the level of that type of content depended on two things: the contex of the game, and what the designer wanted. If one wants definitive answers regarding the thought process into determining the level of mature content in a video game, then it would be prudent to consider conducting this study again with

designers who are in decision-making positions. Doing so would provide additional insight into an area (social impact of video games) that remains as hotly contested a subject as ever with proponents on both sides of the issue. Another related area for additional study could be to conduct this study using developers who develop nonviolent games only and has total control of the process from design through publishing. A study with successful developers with that focus could provide additional insight and allow us to see if the developers have more input into the decision-making process given that the designer and the publisher are more closely tied to the group. It is possible that organizations with a focus on creating nonviolent content games hire like-minded people to develop their content which enable them to make decisions that support the direction of the designer.

Testing video games was mentioned as a major area by all of the participants. The testing process was indicated as iterative and thorough but never truly complete. The developers begin testing from the moment when there is workable code and continues testing through to the date of release of the video game. It then receives feedback from players post-production and makes changes based upon that. The testing of the video game could provide an insightful extension to this study. For a team such as my participants, formal testing is performed by the designers, the developers, and the publishers. Each group has their own focus for the tests, but all have the aim of creating a product that is successful. An examination of the testing processes from each group could provide additional useful information regarding what it takes to create successful video

games and could further assist new developers as they enter into video game development.

Lastly, this study was limited geographically to a small video game development company in the Raleigh-Durham area in North Carolina. Video game development is a global industry with thousands of companies of various sizes. Expanding the study to include developers in other parts of the country or in the global community is a recommendation for additional study.

Reflections

As I embarked upon this study, I did so with the goal of gaining a better overall understanding of developing a successful video game. Video games have been a part of my life since childhood, but it wasn't until my adult years that I began to realize the impact that games have on the players and society. Video games have changed from dots on a screen, such as in the game Pong, to very sophisticated realistic looking games such as Unchartered. The games have changed from the static on-screen mazes and maps such a in Pac-Man and Donkey Kong to games that have open maps with player choices that actually affect the outcome of the game such as in the Mass Effect and Fallout series. As an adult, I begin to wonder what, if any, impact that the newer games had upon my adolescent children. While this study's focus is not aimed specifically at that topic, my journey into understanding what it takes to create a successful video game has certainly helped provide me with a much deeper understanding of the overall impact of video games on my children and in society.

My own personal bias in the study is easily pointed out. I play video games of all types, including the first person shooter games with violent content. As a gamer, I do not believe that violent content in video games negatively affect gamers any more than a violent television show or movie. My bias was further affected by the fact that I have observed a small number of people that I know who personally play these types of games and all of them are very well-adjusted young people and adults.

Throughout my research, I attempted to remain cognizant of my personal bias as it could affect how I interacted with the participants and how I conducted my review of existing literature. I designed open-ended questions for the interview and asked non-leading questions during the exchange so as to obtain the participants' thoughts without my influence, and to generate open and honest dialogue. The information I received was therefore not biased by my own thoughts or opinion on the development process or video games. Additionally, the literature that I found was fairly evenly split on the subject, allowing me to share information on both sides of the debate without injecting my personal feelings. Therefore, while I was admittingly biased against the thought of violent games causing violent behavior, my research methods allowed me to focus on my research questions and to present my findings in a non-biased manner.

I learned a lot during this process. My findings helped me to identify some key concepts used by some successful developers when creating their video games and furthered my understanding of the design and technical processes that they follow. I feel as though I was able to answer my research question and to start a dialogue that will lead to greater understanding in future research in this area.

Additionally, the literature that I found was insightful in a multitude of different areas. I learned that there is a very large school of thought that video games have some type of impact upon the behavior and cognition of its players, whether the impact is positive or negative. I also found that there continues to exist substantial gaps in knowledge in these very same areas because many of the studies were limited. I found in talking with my study's participants that the process of creating successful video games is more focused on generating the fun in the game for the chosen genre than any other factor. The developers rightly take an enormous amount of pride in their efforts to generate successful games and take the feedback that they receive from their constituents, the gamers, very seriously. The developers work hard to incorporate feedback and will repeatedly make changes to their product until they have a game that meets the standards of their gamers. My son has said that he wants to be a part of this industry and this study should help to provide insight for him and others like him.

Summary and Study Conclusions

An understanding into the technical processes used when creating the video games may help people see the high degree of complexity involved from inception to the publishing of a video game. A developer may take on many roles in the process, but it is more likely that, unless he or she is in a very small two to three person team, then that role is focused on a technical aspect of the game and not on the decision-making process. Yet, most of the literature that I found on this subject was limited as most of the articles tended to refer to the development team as one entity (developers) instead of a collection of technical workers performing work under the direction of a designer and in some cases

a publisher. Even when dealing with small development teams such as this study's participants, the findings support that the team members are defined in very specific roles although several members mentioned that they are cross-trained and can perform other duties as necessary. Central decision-making on a project should lead to greater efficiency and a better overall experience for the users once the project is complete. The findings from the participants and literature support that developing successful video games is a complex endeavor with many moving and changing parts. As the industry continues to grow and evolve, the level of complexity is likely to increase. Certain things remained consistent however, and should be adhered to by any current or future video game developer. These include starting with a clear understanding of the project's goals and how the team intends to bring the "fun" into the video game, following an established plan in doing so, relentless testing, and the ability to take and incorporate feedback at all levels and at any given time. Success is tough, and most small games fail to achieve financial success. Therefore, while making video games can be a fulfilling experience, the developer needs to define for him or herself exactly what they consider a success.

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Appendix A: Business Letter of Invitation

Walter K. Williams
Doctoral Candidate at Walden University
XXX@waldenu.edu

Date:

To: Business Manager

Dear Sir or Madam,

I am a doctoral candidate at Walden University and am working on a doctoral study to complete the requirements for completion of my degree. My study is to explore the strategies used by successful video game developers in North Carolina for designing video games that produce challenging yet entertaining and successful video games in a competitive video game market.

Your company was selected as a potential participant in this study based on your history of developing and publishing successful video games. The study will require that I meet with some of your project managers and/or video game designers in various roles in order to gather nonproprietary information about design processes and decision-making. The actual data and participants will remain protected and only interpretative data will be published. The study is designed to pose minimal disruption to your daily business operations and participation in the study is voluntary for all participants chosen.

Please consider participating in this study and respond to me via email at XXX@waldenu.edu or by returning the enclosed agreement form. Your participation in the study will contribute to helping our community to understand the intracancies of video game design and will be particularly useful to young video game players interested in learning more about video game design as a possible future career option.

Thank you very much for your consideration and time!
Sincerely,

Walter K. Williams
Walden University
Doctoral Candidate

Appendix B: Response to Non-Participant Companies

Walter K. Williams
Doctoral Candidate at Walden University
XXX@waldenu.edu

Date:

To: Business Manager

Dear Sir or Madam,

Thank you for your response to my request for participating in my doctoral study. I have chosen another organization to work with at this time but I wanted to express my sincere appreciation for your willingness to assist me in my research. It is through the generous giving of time by organizations such as yours that allows us to add to our body of knowledge.

Sincerely,

Walter K. Williams
Walden University
Doctoral Candidate

Appendix C: Interview Questions

1. Please briefly describe the process that you use when determining which video games that you will develop.
2. How do you prioritize what features you will include in the video games?
3. What impact does social issues such as gender, race, religion and sexual orientation have upon your video game process development?
4. Violence in video games is a hotly contested subject. Describe for me how you balance the use of violence in your games with creating a socially acceptable product?
5. Please describe the primary steps that you use when developing video games.
6. What measures do you take to ensure that your video game will be accepted or played by the greatest number of people?
7. How do you ensure that your game includes proper challenges and goals that are tailored to your targeted genre or audience?
8. How do you receive feedback as to whether your game has been successful?
9. How do popular culture events impact your video game development?
10. What design processes do you use to ensure that your game challenges the cognition of your players?
11. How do you work with others in the organization to ensure that the video game meets established marketing and technical goals?
12. What do you program into the games to gain and keep the attention of your players?

Appendix D Permissions for Figures

Figure 1. Theory of reasoned action (TRA)

From: Gianina Lala <gianina.lala@gmail.com>
Sent: Tuesday, September 19, 2017 4:29:35 AM
To: Walter Williams
Subject: Re: Fw: Copyright Permission Request

Hello Walter,

I'm delighted to be able to help you with the requested material.

Therefore, you have my permission to use Theory of Reasoned Action image.

Thank you .

Gianina Lala

Figure 2. Technology acceptance model (TAM)

September 19, 2017
Massachusetts Institute of Technology
One Cambridge Center, Kendall Square, Building NE18-501
Cambridge, Massachusetts 02142-1601

RE: Request to Use MIT-Copyrighted Material

Dear Walter,

In response to your September 2017 inquiry, the copyright notice corresponding to the image "Technology Acceptance Model (TAM)" found in "A technology acceptance model for empirically testing new end-user information systems: theory and results" by Fred D. Davis (1985) attributes ownership to the Massachusetts Institute of Technology ("MIT"). Accordingly, MIT hereby grants you permission use the image in the thesis "Exploring Video Game Development Strategies for Creating Successful Cognitively Challenging Games," provided that any use of the image contain the proper acknowledgment of MIT's copyright and credits the author. This authorization

to use the copyrighted image also applies to any future editions, revisions, and to mechanical and electronic storage on any carrier.
Sincerely,

Peter Bebergal
Officer

Figure 3. Roger's model

Figure 4. UTAUT2

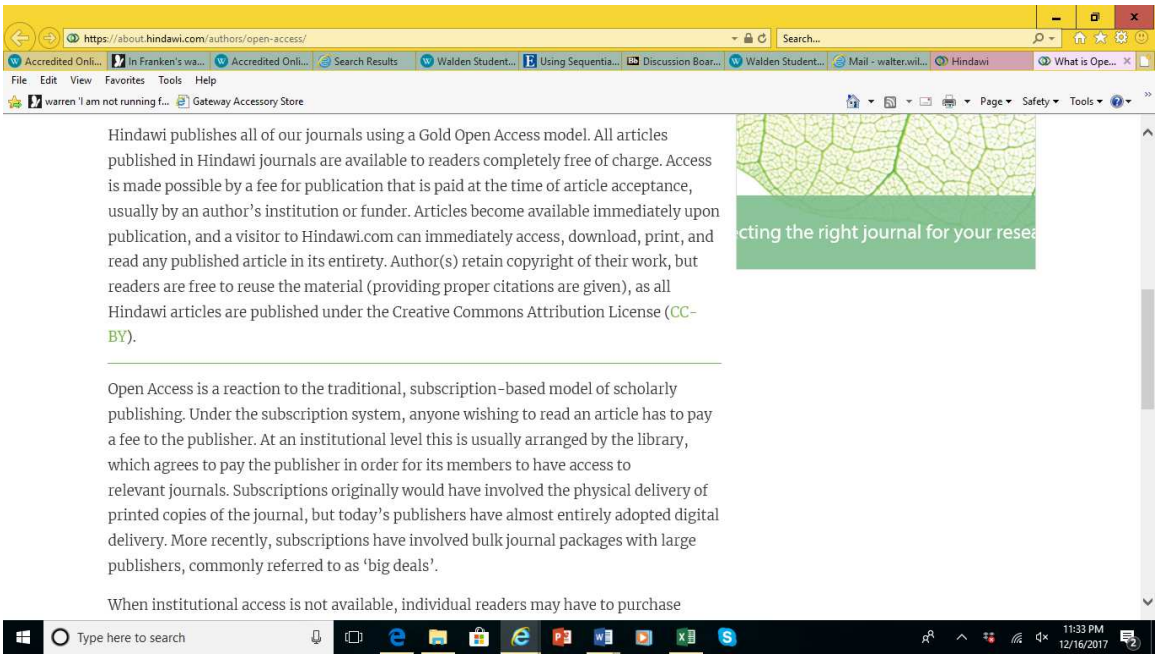
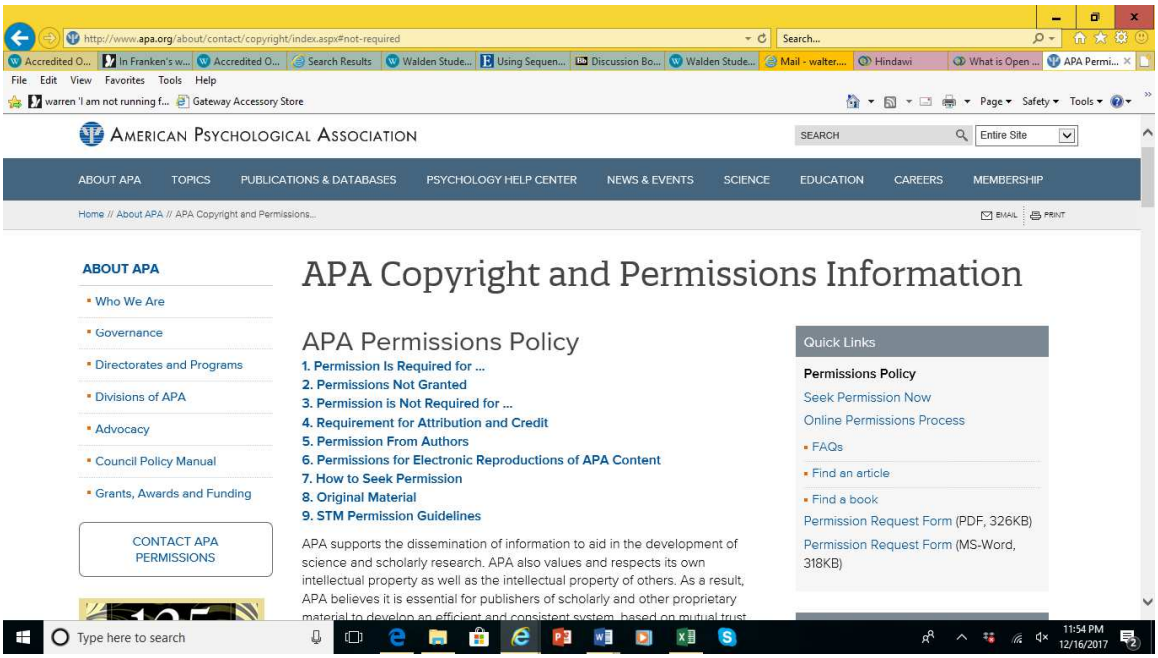


Figure 5. Yoon model



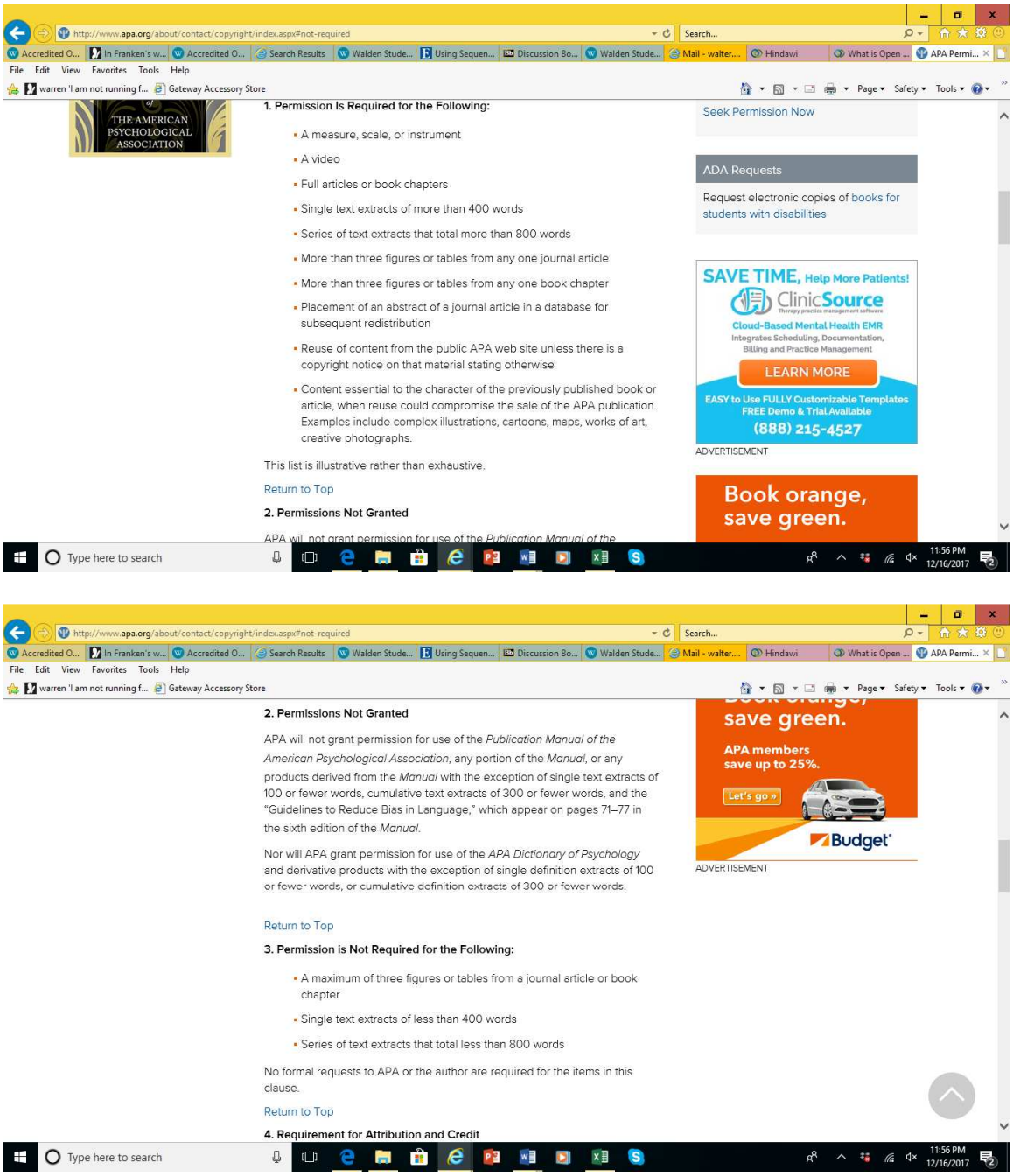


Figure 6. Conceptual map of main genres of video games

Dec 16, 2017

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