GETTING INTO THE GAME: AN EXPLANATORY CASE STUDY TO EXAMINE

THE EXPERIENCES OF FACULTY INCORPORATING DIGITAL GAME BASED

LEARNING IN HIGHER EDUCATION

A Dissertation

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by

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Abstract

GETTING INTO THE GAME: AN EXPLANATORY CASE STUDY TO EXAMINE THE

EXPERIENCES OF FACULTY INCORPORATING DIGITAL GAME BASED LEARNING

IN HIGHER EDUCATION

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Chairperson: Allen C. Grant

Play learning is natural to all human beings and has been a part human culture since ancient time. Teaching children through games is widely accepted, but as we become adults, learning takes on a more serious construction. Research has shown that game based learning can be motivational and result in positive learning outcomes for all levels of learning. However, higher education has been slow to acceptance and use. By taking a closer look into the stories of early adopters that implemented digital games into higher education, this study utilized a multi-case study approach to understand the basis for the decision to use games, and the faculty experience during the game design and implementation phases. Results indicate that the higher education early adopter's decision to use games was a creative solution to resolve conflicts that occurred in their classrooms, and they were intrinsically motivated even though they would not necessarily consider themselves to be "gamers." Each participant received support from their administrators and peers and described their experience as positive. Recommendations for administrators and faculty interested in pursuing digital game based learning in higher education and for future research are provided.

Chapter 1: Introduction to the Research

Introduction to the Problem

The technology boom has provided advancements in multimedia, networking, and new learning technologies (Lau, Yen, Li, & Wah, 2013) that are changing the way educators teach and students learn (Dede, 2005; DeLacy, 2002). Prensky (2001c) described the current generation of students as being digital natives, meaning that they were born into an era that has always offered digital technology and personal computer use. They differ from what he called the digital immigrants, or persons who were born prior to that time and received their formal education without the benefit of such devices. The result of the unification and normalization of digital technology in everyday activities is that current generations have different learning preferences and needs than the generations before them.

Emerging learning technologies are providing opportunities for new pedagogue methods in support of the current educational trend toward authentic learning and shifting the way students and instructors interact (Bozalek et al., 2013; Herrington & Parker, 2013). Instructors find themselves in a continuously evolving educational landscape where in addition to remaining current in their discipline; they are encouraged, if not required, to integrate teaching with recent technological advancements. "If a teacher does not see the need for the innovation/change because it is unclear, too complex or seems impractical for classroom use, the teacher will not embrace the innovation/change" (Ketelhut & Schifter, 2011, p. 540). However, the use of technology-enhanced learning is widespread and necessary in our digital economy (Schweighofer, Grünwald, & Ebner, 2015). Additionally, instructors may be reluctant to explore new technologies with potential for improved student learning simply out of unfamiliarity or pre-conceived negative perceptions of the technologies usefulness or ease of use (Davis, 1989;

Shaban, 2009; Venkatesh, 2000; Zigo, 2016). Faculty need time to be creative, explore and experiment. The continuous emerging of new technologies can be time consuming and overwhelming. According to Sternberg (2002), "for creativity to occur, it must be preceded by a personal decision to think and act creatively, with all the risks attendant on doing so" (p. 376).

Digital game based learning (DGBL) is an emerging learning technology in institutions of higher learning. Prensky (2007) defines DGBL as "any learning game on a computer or online. (Kindle location 3083)." The gaming industry is a multi billion dollar industry that focuses on entertainment, and educators are investigating ways to unite this massive appeal of gaming with instruction to create highly motivational DGBL pedagogy (Löfvall & Henriksen, 2015). Although DGBL is increasingly popular in K-12 education, higher education has been slow to implement this novel pedagogy (Moylan, Burgess, Figley, & Bernstein, 2015; Rooney, 2014). According to the 2016 NMC report, low digital fluency of the faculty limits technology use for teaching in higher education (L. Johnson et al., 2016). Today's educational curriculum designers may be better served in redesign by "…considering DGBL from multiple perspectives and effectively utilizing it with challenging subject matter, [as] a compelling case emerges for its more widespread inclusion in higher education" (Moylan et al., 2015). Many researchers have found DGBL provides educational benefits in higher education programs including willingness to communicate, lowering barriers to learning, encouraging engagement, and increasing motivation (Fernandes et al., 2012; Juan & Chao, 2015; Nadolny & Halabi, 2015; Reinders & Wattana, 2014).

Statement of the Problem to Be Researched

Higher education is a new frontier for DGBL, and as such, there is little research on the design and implementation process, options for securing or developing games, and challenges

presented by the unique pedagogic platform. Even fewer publications emphasize the experiences of faculty that are early adopters of the technology driven DGBL pedagogy and have paved the way for DGBL use in higher education. Most educators would agree that we "need to be adventurous in our teaching and create a rich and multidimensional fabric of learning" (Nerantzi, 2013, p. 143). Unfortunately, the faculty's desire to design creative and innovative educational environments is not enough and organizational and individual barriers that keep faculty from engaging new learning technologies occur (Miller, Martineau, & Clark, 2000). There is evidence that the "tendency of faculty technology use [is] tied to the individual's discipline, type of institution, and teaching role as well as a need for productivity" (Meyer & Xu, 2007, p. 194). Therefore, the experience of each faculty that implements DGBL may rest along a continuum, being profoundly different in some respects, yet very similar in others. Although uptake of DGBL in higher education is uncommon, some faculty instructors do engage. However why and when they engage is still a curiosity. Prior to this research, these phenomena, as it relates to faculty experience, has not been studied. A learning technology like DGBL that engages an entirely new instructional platform, requires a new set of skills and a creative vision. It is unclear what motivations and supports drive some faculty to develop an innovative curricula that others may perceive as being unreachable and the effort too time consuming to garner serious consideration. DGBL has touted many benefits and opportunities for authentic learning and has potential as a useful educational tool (Ebner & Holzinger, 2007). Faculty that are early adopters of DGBL across multiple universities are finding ways to circumvent the challenges of implementing DGBL (Burton, Lockee, & Wang, 2011; Ebner & Holzinger, 2007; Nadolny & Halabi, 2015; Nerantzi, 2013; Ross, Fitzgerald, & Rhodes, 2014; Slota, 2014), and those

universities that have not yet begun to get into the game may soon find themselves behind the eight ball.

Purpose and Significance of the Problem

The purpose of this multi-case study was to examine the experiences of higher education faculty that have made the decision to implement DGBL as a novel pedagogic method in higher education. This study includes the perceptions of faculty and support staff involved in the innovation. Faculty need to be committed and engaged, and have a clear vision when implementing a new technology like DGBL (Bohle Carbonell, Dailey-Hebert, & Gijselaers, 2013). It also requires a degree of creativity and innovation to step outside the box and design a new learning environment. "Creativity is about connecting the dots. The more dots you have to work with, the more combinations available to help generate new ideas" (Birla, 2013, p. 17). A goal of this research was to provide an important resource based on the experiences of early adopters of DGBL in higher education. By detailing the experiences of early adopters, midlevel adopters will be able to build a clear vision and connect "more dots" promoting their individual creativity that in turn, will lead to a more positive experience and outcome.

DGBL is a new pedagogy and represents a real change for higher education; and change is often resisted. "We are all products of our age", wrote Peter Senge (2012), "and, in turn, act in ways that re-create that age" (p. 32). Innovative organizations, including universities that have incorporated DGBL into training and curriculums, have found ways to overcome the resistance to change. Leading for innovation requires providing the proper environment that nurtures creativity and successful implementation of innovative ideas (Birla, 2013). Leadership for change in institutions of higher learning can be initiated through a "top down" approach where university administration initiate the change, or from the "bottom up" approach where faculty

leadership initiates the change (Bohle Carbonell et al., 2013). Both approaches require a plan to manage the time constraints and promote time management skills. "Time management skills are needed to balance the demands of today's creative work and accountability burdens for teachers" (Lorfink, 2012, p. 18). This research concludes by proposing strategies that support faculty in balancing workloads while generating an environment that encourages development of creative and innovative pedagogies like DGBL.

Proficiency in digital media and technology, and the '4C's' (critical thinking, communication, collaboration, and creativity) are often referred to as '21st century skills' or '21st century competencies' (Binkley et al., 2014). There is a broad base of literature that addresses the need for educational systems to provide these 21st century skills suggesting the best way to prepare students for employment the digital age is through use of technology enhanced learning in the classroom. Technology enhanced learning, which includes game-based learning, affects both the instructor and the student. However, there is a gap in the literature between the student needs and how technology enhanced learning is provided in practice to address those needs; and this is particularly true for instructors implementing DGBL (Charlier, 2012; Razak, Connolly, & Hainey, 2012; Webb, Bunch, & Wallace, 2015). A review article by Schweighofer and Ebner (2015) found a mere three publications, "the smallest number of articles in any category" that discussed instructor needs, signifying that the current literature is heavily skewed toward the effects on the learner as opposed to the instructor experience (p. 38). For this reason, this study addressed the literature gap by detailing the personal experiences of instructors that have implemented DGBL.

Research Questions

1. What was the basis of the faculty decision to implement DGBL?

2. How do instructors balance the effort required to implement DGBL with their workload and academic responsibilities?

3. How did additional support (or lack of) influence the faculty experience when implementing DGBL?

The Conceptual Framework

Researchers Stances and Experiential Base

At the time of this study I was employed as a junior faculty member at a private non-profit university and had accumulated over twenty years experience as an instructor in higher education. In addition, to teaching traditional face-to-face courses, I was at the instructor level when online learning became mainstream and therefore am described as a digital immigrant. Digital entertainment games became popular in my early adulthood and I frequently played and enjoyed digital games. However, I have not been an avid player of digital games for many years. I have incorporated instruction that used DGBL as a suggested supplementary activity, but have no personal experience with DGBL as the primary means of knowledge transfer. My opinions on the use of DGBL in higher education are malleable. I believe that games are an inherently good way of learning and that the human instinct in all of us enjoys play. However, I do not believe that DGBL will be a suitable pedagogy for all faculty or students, but I do believe that it is a pedagogy that warrants serious consideration and exploration that holds great potential as an educational tool for all levels of education.

Conceptual Framework

Students have indicated that a more complex use of technology in education would improve their attitude toward learning (Moyle, Wijngaards, & Owen, 2012). It falls upon the higher education faculty to incorporate these creative learning strategies. DGBL is finding it's way into higher education curricula. This research provides information through a multi-case study analysis that examines the experiences of early adopters of DGBL, the basis of their decision to pursue DGBL, support that they did or did not receive, and their time management strategies. To inform this research, the literature review focused on three key streams of knowledge: (a) Creativity and Innovation: Creative People and Innovative Organizations (b) Trending Innovations in Higher Education and (c) DGBL in Higher Education.
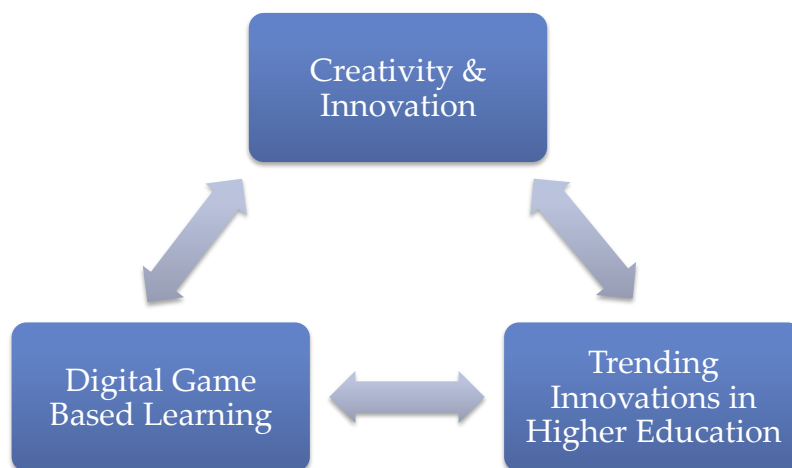
Figure 1. Conceptual framework.

The three streams that support this current research proposal are represented in Figure 1. The first stream of the review of the literature discusses creativity and innovation. Creativity is defined as the production of novel and useful ideas (Amabile, 1996) whereas innovation is the successful implementation of those creative ideas within an organization (Amabile, 1996) that

create a change that is of value. Oldham and Cummings (1996) describes creativity as being on the individual level while innovation is on the institutional level. The researchers also differentiate between routine and radical innovations describing routine innovations as minimal changes and radical innovations as larger changes that require a broader shift in perspective and existing practices, requiring substantial reorganization and implementation processes and considerable time. The abundance of literature on creativity was narrowed into creative traits and attempts to measure them, the importance of time management, and environmental conditions that support creativity. Amabile (1997) having completed 20 years of research stated "a person's social environment can have a significant effect on that person's level of intrinsic motivation at any point in time; the level of intrinsic motivation can, in turn, have a significant effect on that person's creativity" (p. 40). The level of creativity is important in that the way learning is merged with a game will depend on the creativity and experience of the educators creating and implementing the game (Prensky, 2001a). In addition, the creative process of early adopters for DGBL in higher education is interwoven with the innovative strategies employed by the institution. "Institutions are engaging in evidence-based teaching and learning by using the built-in analytics of games, simulations, and mobile apps" (L. Johnson et al., 2016, p. 17). There are many possible barriers to innovation including time management and peer and institutional support structures (Prensky, 2001a), therefore these constructs are reviewed within this first stream and examined within the context of this research proposal.

The second stream examines the transformations that are occurring in higher education as a result of the changing demographics and educational needs of the student population, and the emergence of the digital age. Technology is changing how professors teach and how students learn. The 21st century learners and the competencies required to be successful in the current and

future society have changed with the digital age. Certain competencies such as critical thinking skills and problem solving are not necessarily unique to this century (Voogt, Erstad, Dede, & Mishra, 2013), however the need for digital literacy, and creative and innovative abilities is gaining attention. Students are demanding learning scenarios that include technology enhanced learning approaches (L. Johnson et al., 2016; Schweighofer et al., 2015). However, "focusing strictly on technology trends can obscure other environmental factors that are drivers for innovation in higher education" (Staley & Trinkle, 2011, p. 15). Many of these technologies were developed in answer to the changing "traditional" student and their specific needs. A discussion of the current and future technology enhanced learning innovations concludes this second stream.

The final stream examines the emergence of DGBL as a creative and innovative learning technology with evidenced potential to address 21st century learning competencies. The video game industry has surpassed movie revenue exceeding 75 billion dollars (Prensky, 2001a) and educators have been exploring ways in which to combine the immense popularity of digital games with teaching and creating an exciting and emerging learning technology. Unlike the game industry whose primary concern is player enjoyment, the educational sectors primary concern is the transfer of knowledge and is using the fun component of games as a means to engage learning. According to Prensky (2001a), games work as an educational tool due to the interconnectivity of the learners engagement and interactivity. Unlike the entertainment industry, educators have the additional challenge of ensuring the pedagogical component takes precedence without diminishing the fun component that provides the intrinsic motivation to keep the learner engaged. DGBL is more prevalent in K-12 and has been successfully implemented at accepted at this education level for quite some time. This trend is now advancing and spreading into higher

education. Therefore this stream focused on DGBL emergence, pedagogy, and adult learning

theory and concludes with game options available to instructors interested in DGBL curriculum

integration.

Definition of Terms

Creativity - The personal capacities and process of generating a unique product that has value

> (Middlebrooks, 2015).

Curiosity - The desire to explore the unknown and gain experience (Nowotny & Cohen, 2008)

Distance Learning- a method of study where teachers and students do not meet in a classroom

> but use the Internet, e-mail, mail to have classes (Merriam-Webster.com).

Digital Game Based Learning - The combination of educational content and computer games

> (Prensky, 2001a). Includes the components of game based learning with the addition of a

> digital medium such as a computer, tablet or smart phone.

Digital Natives - People that have spent their entire life surrounded by technology (Prensky,

> 2001b)

Digital Immigrants - Those people that were not born into the digital age but have adopted

> technology (Prensky, 2001b).

Early Adopters – Defined by the Diffusion of Innovation Theory (Rogers, 1995) as a minority

> group (described statistically as first 13.5% of the population) that is the first to try new

> ideas, processes, goods and services. This group can cope with a "high degree of

> uncertainty about an innovation at the time of adoption" (Rogers, 1995, p. 264).

E-Learning – "The process of extending learning or delivering instructional materials to remote

> sites via the Internet, intranet/extranet, audio, video, satellite broadcast, interactive TV

> and CD-ROM." (Holsapple & Lee-Post, 2006, p. 68).

Game Based Learning – A type of game play that has defined learning outcomes. The game is

designed to balance subject matter with gameplay and the ability of the player to retain

and apply said subject matter to the real world ("What is GBL (Game-Based Learning)?,"

2017).

Game Based Learning describes an environment where game content and game play enhance

knowledge and skills acquisition, and where game activities involve problem solving

spaces and challenges that provide players/learners with a sense of achievement (Qian &

Clark, 2016)

Innovation – New methods or things that deliver value (Middlebrooks, 2015).

Mid-level Adopters – also known as "early majority" by Rogers (1995) are statistically the 34%

of the adopters that follow the early adopters. This group look to early adopters "for

advice and information about the innovation" (Rogers, 1995, p. 264).

Mobile Learning – Learning that "takes advantage of mobile phones, and other mobile,

connected and pervasive personal technologies, in the design of learning experiences that

exploit the richness and uniqueness of the learners indoor or outdoor environment"

(Trexler & Kukulska-Hulme, 2015, p. 1)

Pedagogy – Teaching, as a professional practice and as a field of academic study. It

encompasses not only the practical application of teaching, or pedagogic, skills, but also

curriculum issues and the body of theory relating to how and why learning takes place

(Harvey et al., 2016)

Assumptions and Limitations

This research has several underlying assumptions that were considered and understood

prior to its undertaking. One major assumption was that the experience of each of the faculty is

unique, and that this will be in part due to their prior personal experiences, expertise, workload, support, and challenges. It was assumed that the implementation of a new technology was time consuming, although it is uncertain to what degree. It was also assumed that the incorporation of DGBL into a curriculum was intrinsically motived and was not a requirement of their position within the university or part of their job description. It was also assumed that the faculty faced challenges during implementation that would affect their experiences, although there was no assumption as to what those challenges were. Finally, this qualitative research study assumed that the interview participants answered the questions with careful consideration and with honesty.

At the time of this study, the researcher was an active participant in a department where digital game based learning was being developed. This presented a challenge to remain unbiased during the interview process and required the researcher to set aside personal experiences and to listen to the interviewee's account of their experiences. The investigator conveyed an "impersonal, objective tone" while speaking with the participants (Creswell, 2015, p. 16) and the interview questions were "open ended and general, lending support to the noninvasive stance by the researcher (Creswell, 2015, p. 209). A limitation to this study described by Creswell (2015) is that the nature of an in-depth case study approach is limited by the number of participants. DGBL is fairly uncommon in higher education; however, a deliberate effort was made by the researcher to include a diverse participant population that was not limited by personal attributes such as age gender or ethnicity or professional attributes such as discipline or type of institution, so long as it was higher education. The study was also limited by the participant selection method. The participant selection was through peer-reviewed publications. It was acknowledged that not all faculty instructors that implement DGBL published their work. Finally, in some

instances faculty acted independently or without the assistance of a support staff, and in other instances the support staff was unavailable for interview.

Summary

This chapter described the problem and purpose of this research. Incorporation of a new learning technology is often a learn as you go practice that tends to be overwhelming for an already overextended faculty resulting in underutilization of learning technologies with potential for improved student learning. Additional research is needed to assist instructors in terms of their own technological efficacy and "learn both why they should adopt and how to become adept at integrating technologies" (Ketelhut & Schifter, 2011, p. 539). It is important that instructors are creative, and institutions of higher education are innovative. Recently, some are allowing their creativity and innovation to surface through the inclusion DGBL into their curriculum. The research conducted in this study provides an opportunity for faculty that would like to become mid-level adopters of DGBL to learn from the experiences of their peers who have forged the path ahead by being early adopters of this novel pedagogic technology. This research study sought to describe the experiences of the early adaptors and explain the basis for their decision to implement DGBL through exploring the personal attributes and creativity of the faculty, the support structure and innovative strategies of the institution, and reveal other constructs that may positively or negatively affect faculty's experiences and decision making process.

Chapter 2: The Literature Review

Introduction to Chapter 2

This chapter provides a review of the literature that discusses creativity and innovation and digital game based learning in higher education. "Openness of thinking and a genuine sense of a need for something better are vital ingredients if students are to be given access to a process of education that equips them to deal with life in the 21st century" Prensky (2007, p. Kindle Location 3080). The chapter begins by reviewing the literature on what constitutes creativity and innovation and the approaches researchers have developed to measure creativity. It explores what inspires people and institutions to be creative and innovative. The second stream presents an overview of current and future trends in technology enhanced higher education. The final stream focused on digital game based learning as a creative and innovative pedagogy and discussed several learning theories that are applicable to DGBL. The final stream concludes with considerations for implementation of DGBL into higher education curriculum. These three streams in union provided the structural framework needed to support this research. Inefficient game design and poor instructional design can compromise programs. Before incorporating DGBL it is important to define what technological and pedagogical knowledge is needed, and for faculty to have to have a 'game plan' and proper support staff available (Löfström & Nevgi, 2007) to insure a successful implementation that provides an enhanced learning experience.

Creativity and Innovation: Creative People and Innovative Organizations

Creativity and innovation is a broad and complex concept that is applicable to any sector and will vary in accordance to that sectors values and goals. Both creativity and innovation are imperative to human progress. Although they are often spoken about in unison and even used interchangeably, creativity and innovation are two different things. Creativity is the production

of novel and useful ideas in any domain (Amabile, 1988). Creative thinking includes believing in creativity, curiosity, and openness to new perspectives (Dundon, 2002), making it difficult to measure. Researchers have looked at defining creativity in terms of a person's attitude and interests and that a creative person will speak favorably of creative activities (Hocevar, 1981). Innovation, on the other hand, can be defined as "new things or methods that deliver value" (Middlebrooks, 2015, p. 43) with emphasis the end product being of value. However, importance has been placed on either creativity or innovation, depending on discipline in which they are being studied. A review of the literature conducted by Forgeard and Kaufman (2016) found that creativity is most often investigated by educational, psychology, and creativity journals and innovation was most often the subject of business or industrial and organizational psychology journals. It is widely accepted that without creativity there can be no innovation.

Creativity and innovation have gained considerable attention from educational institutions in many countries (Newton & Newton, 2014). These institutions realize that creativity is critical for a 21st century workforce that requires technical, non-routine skills that are dynamic and interactive in nature. This is particularly true in light of pressing global concerns of global warming, clean water, and antibiotic resistance among other concerns and the need to grow global awareness and foster creative solutions. As Hamel (2000) clearly and urgently stated, "In these suddenly sober times, the inescapable imperative for every organization must be to make innovation an all-the-time, everywhere capability" (p. 20). Unfortunately there is an ongoing struggle for organizations to implement innovative strategies (Kuratko, Covin, & Hornsby, 2014). If innovation is based on creativity, can we measure creativity to ensure innovation?

Creative Traits and Measuring Creativity

Many researchers find that creative people are highly self motivated, were intuitive with problem solving skills and risk takers (Amabile & Sensabaugh, 1992). Personal characteristics such as these have been investigated through case study, questionnaire, and experimental paradigms. Several methods have been developed to measure creativity, yet it remains an elusive concept to accurately put a measure on. Thus far there has been no strong evidence that concludes that creativity is rooted in biology or favors the male or female genetics. Any differences found between the sexes have been generally attributed to different social and environmental contexts (Baer & Kaufman, 2008).

The Torrance Tests of Creative Thinking (TTCT) is a test that was originally developed in 1966 by the "father of creativity" Dr. E. Paul Torrance. The TTCT has undergone several modifications over the years, and is still one of the most widely used creativity tests. A more complex definition of creativity put forth by Torrance (1966) is:

> a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results. (p. 6)

The TTCT test measures thinking creativity in two separate parts, one that makes measurements through use of pictures and the other through the use of words. The test measures creativity through five mental characteristics: fluency, elaboration, originality, resistance to premature closure and abstractness of titles. The test is used for all ages and both sexes. The TTCT test was used to examine gender differences in creative thinking by Matud, Rodríguez, and Grande

(2007). The researchers found very specific significant differences between genders when examining level of education. The women in the study with an advanced education scored higher than women with primary and secondary educations. Interestingly, that same educational related difference in creativity was not observed in men. University educated women scored significantly higher than men in verbal fluency, while men scored higher in figural originality and figural creativity indices. Another study by Bender, Nibbelink, Towner-Thyrum, and Vredenburg (2013) used the TTCT in combination with other personality tests. The results showed differences that favored men as being more creative with correlations to openness, extraversion resistance to social demands, substantial personal powerfulness, high energy and impulsivity. Additionally, the results showed that creativity in women correlated with internal incongruity, feeling of interpersonal power and influence and low levels of emotional pain. Baer and Kaufman (2008) believe that the "over-arching" reason that these differences exist is "the conducive environment in which to develop expertise and in which one's creative performance is judged have been different for men and women" (p. 77). As previously stated, there is no evidence that creativity differs between men and women based on biology.

Not all researchers are in agreement on the validity of the TTCT test and the tests ability to measure creativity is a debated. A study by Almeida, Prieto, Ferrando, Oliveira, and Ferrándiz (2008) examined the construct validity of the TTCT through the analysis of three completed studies and found inconsistencies in the data, however unlike the previous study this cross-study analysis was limited to children and did not differentiate between the sexes. As is apparent by the debates in the literature and suggestions to define more neutral tasks to creativity assessment (Almeida et al., 2008), creativity have proven to be difficult to measure in any absolute terms.

Studies have used the qualitative approach to determining creativity. Amabeile's Consensual Assessment Technique (CAT) has been a popular choice for assessing creativity in different domains using a self-reporting methodology (Amabile, 1982, 1996; Hennessey & Amabile, 1999). Using this system of measure, the participants are asked to create something and experts evaluate the creation. One major drawback to this test is the need for a team of creativity experts to do the assessments. Another creativity test, the Amusement Park Theoretical Model (APT) takes into consideration the different disciplines and the tendency of a person's creativeness to reside in "one area of the park" more than another (Baer & Kaufman, 2005). For example, a creative poet, writer, scientist, or politician will all be creative in a different way. The Domains of Creativity Scale (K-DOCS) allows researchers to investigate individual domains on more of a micro scale of sub-domains through a self-reporting method that considers age and life experience (Baer & Kaufman, 2005; Kaufman, Cole, & Baer, 2009; McKay, Karwowski, & Kaufman, 2016).

Recently researchers have become interested in the relationship between self-perception of creativity and creative performance. This is not a new concept as Hocevar (1981) stated that the "most easily defensible way of identifying creative talent is in terms of self-reported creative activities and achievements"(p. 455). However, it has been suggested that global self-perceptions might not align with actual performance due the performance being domain specific, and those who lack expertise in a domain tend to overestimate their performance, while those who are most competent tend to under value their performance (Pretz & McCollum, 2014). In addition, not all creative people will share personality dispositions, for example creative artists will not share the same traits as a creative scientist (Feist, 1998). Twenty five years of creativity studies has lead to the conclusion that although there are many differences between creative people, there is one key

attribute that they share, and that attribute is the *decision* to forge their own path and see their vision through (Sternberg, 2002, 2006). Hence, this research looked at the creative traits from faculty involved in various disciplines with a focus on their decision to be creative.

Fostering Creative Environments

Creative workspaces are associated with freedom, autonomy, and few boundaries, as evidenced in Google's playground like workplace design. In an interview with CBS, the head of Google's People Operations Department stated, "the employee should own their individual space, be as creative as possible and we shouldn't get in the way"(Blackstone, 2013). Unfortunately, in many cases employees find them selves in a work environment that requires creativity under constrained and busy schedules and for creativity must be managed in the mist of an otherwise busy workload. Many studies have examined the factors that foster creativity in the work environment. A study by Amabile and Sensabaugh (1992) reveled that most interviewees cited freedom in their work environment as an important component in cultivating their creativity, along with sufficient resources and specific organizational characteristics. One participant was reported as saying,

> there was not a lot of restriction on our ability to try new things and to look at
> different ways of doing things. They did not manage us closely. Instead, we had
> responsibility and control. We had a lot of freedom, and when you have that kind
> of freedom, you tend to work a lot harder (p. 21).

In addition, the participants felt more compelled to be creative when provided technological advantages and a network of support that included a monetary budget and the expertise of a collaborative team. Importantly, the study reported on the need of the organization as a whole having an atmosphere of innovation and provided room for failure. As stated by Fullan (2011)

"learning involves the risk – and even certainty – of some failure" (p. 114). Adaptive challenges requiring creativity require faculty to have stamina to withstand the agonies of the process and forge their way through obstacles and failures.

Many organizations find it difficult to institutionalize time for reflection and learning (Fullan, 2011), and employees can face time pressure for performing required tasks. Time pressure was defined by Benson and Beach (1996) as the difference between the available time and the time needed to complete a task. A study by Kayaalp (2014) examined the relationship between perceived time pressure and multi-tasking and creativity. The study argued that time pressure may "act as a moderator between time orientation and creativity of individuals in the context of a person – situation interaction" (p. 73). Creativity decreased with both multi-tasking and perceived high time pressure. The researchers put forth the explanation that when subjected to high time pressure, the individual simply did not find the time needed to be creative and experienced higher levels of stress that resulted in simpler, less effective processing strategies. Being disciplined and incorporating time management strategies into daily work routines will alleviate stress and allow time for creative flow.

Creativity may be more likely among those who are intrinsically motivated to be creative and thereby put forth an effort to make the time. Intrinsic motivation is the drive to do something because it presents a challenge or is interesting and is necessary to achieve high levels of creativity (Pink, 1995). A study by Ceci and Kumar (2016) found a positive correlation between those participants that were intrinsically motivated to be creative and an increase use of various techniques to be creative. This suggests interplay between inspiration and discipline that results in maximizing creativity. These findings agree with a study by Darini, Pazhouhesh, and Moshiri (2011) that time management techniques, for example daily planning, was significantly related to

individual creativity. There is a general consensus in the literature that creativity requires time

and is best achieved when the creator has been strategic and managed their time to allow for

creative efforts to be realized.

Creativity is not an all or nothing phenomena. According to Michael Kirton's Adaption-

Innovation Theory (AIT) all people solve problems, are creative, and fall along a continuum of

adopters who do things better (adopters) through innovators who doing things differently

(Kirton, 2011). All people have their individual problem solving style, skill set and constructive

knowledge from which their creativity flows, in addition to their individual beliefs and attitudes.

The AIT also takes into account the individual creativity of each person and how it ties together

in a collective collaborative effort, a concept important for institutions of higher learning.

Additionally, most organizations have a hierarchy of roles with an administrative side and

faculty side, and it is important that the innovative visions of the administration embrace the

cultivation of a creative faculty. Faculty instructors have their own unique position along the

creativity continuum, affected by their personal experiences and interactions with their

organizations support network.

Trending Innovations in Higher Education

Just as individual creativity requires time and strategy, institutions would do well to

include creative and innovative strategies for their future successes, and this is especially true in

educational institutions. There are two categories of innovation and change in the school setting.

The first level is developing high quality educational practices and the second is the

administrative process (McCharen, Song, & Martens, 2011). A study by Crowther, McMaster,

and Hann (2001) found that the primary motives for innovation were educational needs,

expectations and market pressure. Importantly, the study also found that a clearly articulated

vision by the school leaders were instrumental in putting through the innovations. Both levels are important and must be intertwined in a collaborative approach.

Bohle Carbonell et al. (2013) stated the following:

If you want to innovate, it's difficult to do that top down because the board doesn't necessarily know where to go. You need the people at the workplace who see possibilities to innovate and that fit into the curriculum in that faculty and with the colleagues in that faculty. You need others, colleagues who are motivated too and want to collaborate with you. It requests a lot of effort to initiate innovations. And you cannot do it alone. (p. 37)

Technology-enhanced education has provided a means to meet current student demands, although implementation of educational technology can be very successful or it can be an abysmal failure (Löfström & Nevgi, 2007). Institutions, and people within those institutions, are going to need to change in ways that allow them "to adapt in positive ways to change" (Chaplin, 2013, p. Kindle Location 416). There are several technologies trending in higher education today that are changing the landscape including the popular e-learning strategies of online learning and mobile learning and less popular digital technologies that are beginning capture the attention of educational institutions and faculty like DGBL.

Online Learning

Online learning, one of the most successful innovations of higher educations that have become more a norm, are still evolving with the advent of new technology developments. Traditional face-to-face on campus courses are still by far the most common teaching method, however courses are increasingly being infused with web-based technology. Some of these courses are hybrid in nature with online elements, while others have been transformed to a completely online version (Fuller & Yu, 2014). The 2015 Online Report Card (Allen & Seaman,

2016) reports current online enrollment numbers for higher education at 5.8 million. Online education is booming in private not-for-profit higher education institutions. More than 75% of institutions that provide distance education remain confident that online is critical to their institutions future sustainability. Although the focus remains on students from the areas that the institution traditionally served, the geographic reach of institutions that provide online programs is growing.

The increasing global environment has resulted in expanding global student markets. Institutions of higher learning are shifting to new integrated transnational and virtual markets (Loomis & Rodrigues, 2009). Over the next 12 years, the World Bank estimates a 25% increase in global higher education attendance from 200 to 250 million (L. Johnson, Adams Becker, Estrada, & Freeman, 2014). Most education providers are U.S. centered and these providers are incorporating online learning degrees to increase their student base and increase their program sustainability. As stated by Johnson et al., "Online learning is seen as a key strategy for increasing access to higher education" (p.31). According to a 2015 report published by the Online Learning Consortium (formerly the Sloan Consortium), more than a quarter of students take at least one distance education class. However, the percent of academic leaders that believe online education is critical to their long-term strategy is down to 63.3% from 70.8% between 2014 and 2015 (Allen & Seaman, 2016).

The additional technology requirements of online courses require a collaborative team based approach between the administration, instructors, and support staff. Therefore, instructors may be required to take on additional or modified roles while in collaboration with school administration, instructional designers and technical support personnel, who in turn become more involved in course development. "It takes time to thoroughly develop, evaluate, and revise

a course for online delivery" (Orde et al., 2011). The process of learning new skills and training

has been reported to add to the stress of faculty who teach online and faculty with high online

teaching workloads have been found to exhibit higher rates of burnout compared to those who do

not teach online (Guri-Rozenblit, 2009). Another study by Tomei (2006) found that online

teaching increased teaching loads by a minimum of 14% when compared to traditional face-to-

face instruction. It is evidenced that online teaching has added to the stress and workload of

higher education faculty, however the affect on the faculty creativity has not been well

established.

Mobile Learning

Mobile learning is generally considered a subset of e-learning and defined as "instruction

and learning delivered and conducted via highly portable (preferably wireless) technologies

including laptop computers, tablet, PCs, handheld computers, game consoles and cellular

telephones" (Evans, 2009, p. 96). Consumer technologies like cellular phones are generally

purchased for personal use and not commonly used as an educational tool. However, the fact that

the cellular "smart" phone use is trending as a common communication tool makes them alluring

for use in the educational setting. Applying a new digital strategy to a consumer technology tool

like a smart phone is something that is new and has unlimited potential (L. Johnson et al., 2014).

It has been estimated that nearly 80% of people will use mobile devices to access the intranet (T.

Johnson, Wisniewski, Kuhlemeyer, Isaacs, & Krzykowski, 2012). It should be noted however,

that as common as cell phone ownership has become, and as tremendous as the increase in global

connectivity has been in recent years, there still remains the problem of unequal access to the

technology. However, these mobile devices have the advantage that they *are mobile* and

therefore the potential to be useful for many applications. Many schools have frowned upon the

use of cell phones and have restricted their use by both students and teachers (Obringer & Cofffey, 2007). In contrast to these finding, some educators have proclaimed the potential benefits of cell phone use in classrooms, including access to information, recording data, creating podcasts and photo journals, record data from experiments and interacting in large auditorium style lecture and even poetry analysis (Chenug, 2008; Pascopella, 2009 ; Schachter, 2009 ; Sterner, 2015). A study conducted by (Tessier, 2013) reports that students found the use of cell phone technology in the classroom to be a positive experience when used for educational purposes. These educational purposes are becoming even more alluring now that developers are realizing that mobile learning can be tailored to individual learners and delivered in real time.

Real time learning is a significant impact of mobile technology that allows for lessons that practice rapid decision making while providing immediate feedback on the consequences of the learners decisions (Cornelius & Marston, 2011). This is an attribute 21st century learners, having grown up in the digital age, have come to expect. Hung, Hwang, Yu-Fen, Wu, and I-Hsiang (2013) developed a scaffolding framework for a mobile learning application used during an ecology field trip that included supplementary information and immediate feedback to the learner. The real time feedback helped the students clarify content knowledge, stay focused on the learning outcomes, and assist their study progress. The researchers acknowledge the need for future studies in the constructed responses, but put forth that the student perceptions of the real time mobile learning could substantially improve student in-field performance in comparison to the traditional approach. Additionally, the instructors found the mobile learning device engaged the students and encouraged them to raise their own questions in regard to the lesson.

There is a bright future for mobile game based learning. Research and Markets reported the global game-based learning market was forecasted to grow 15.6 percent from 2012-2016

with the major contributing key factor to this growth in mobile-based educational games (Wood, April 9, 2013).

The Future of Educational Technology

According to the NMC Horizon Report (L. Johnson et al., 2014) the need for digital media literacy among educators has increased in importance, however, faculty training does not reflect this urgency and we are far from seeing digital media literacy as a norm. The need for technically savvy faculty cannot be understated. Faculty development that focuses on learning a new educational technology "may be a catalyst for faculty to reflect on and evaluate their current teaching practices" (McQuiggan, 2012, p. 28) and inspire a more creative approach to education. The interest of this current research proposal is in DGBL for higher education. Interest in DGBL in higher education as a creative and innovative pedagogy expected to flourish in the future. This is evidenced by the emergence of large research hubs like Arizona State University's Center for Games & Impact and MIT's Education Arcade (http://education.mit.edu), although it is noted that adoption of DGBL is still in the experimental stage. According to the leading market research company The NPD Group, approximately half of all digital game downloads are for mobile devices (Riley, 2011) making mobile gaming one of the fastest growing segments of digital game market. The number of educational digital game applications (apps) available for mobile devices, particularly smart phones and tablets, continues to grow.

Wearable technology, electronic technologies or computers that are worn on the body as an accessory or part of the clothing, is being pursued by many universities (Mehdi & Alharby, 2016). These technologies have already been successful in the role of healthcare, entertainment, business and education. "The benefit of including "wearables" in the curriculum for the bachelor and master degree levels will be through increased creativity among students." (Mehdi &

Alharby, 2016, p. 6). Wearable devices for educational purposes include a communication technology that enables learning in real time. These include items such as watches, bracelets, glasses, textiles and Google Glass. Google Glass was Time Magazine's 2012 "Best Invention of the Year" is a hands free device that allowed the wearer to take pictures and video, search the internet, chat live via Google Hangouts along with other useful daily task oriented applications. Google glass has been implemented as a means for consultation between surgeons during an operation (Schreinemacher, Graafland, & Schijven, 2014). Unfortunately, the fate of the Google Glass technology was a dismal one with much of the failure blamed on the lack of clear market segmentation, signifying the importance of how a technology is initially presented can matter a great deal. Game makers are exploring the wearable technology arena, however this technology is in its infancy. One industry leader, Vuzix, has announced the development of the iWear Video Headphones that allow for a more immersive gaming experience. The headphones can be used in Open Source Virtual Reality (OSVR) platforms to intensify the game experience. Universities have joined OSVR worldwide as part of an OSVR Academia program. Iowa State University is part of the OSVR Academia program and Associate Professor Nir Keren explains, "The inability to alter software to serve the research objectives of higher education is a roadblock that we're now able to overcome" (Korolov, 2015). Justin Woodward of Interabang Entertainment is excited to see how the future of wearable technology innovates the game experience through virtual reality (Vuzix, 2015). Innovative technology that allows gamer players to be submersed in a virtual world has great potential for the future of DGBL.

The landscape of higher education is rapidly changing driven in part by the changing demographics of the student body and in part by the emerging and continually changing digital age. The incorporation of DGBL has potential for use in traditional face-to-face courses but also

aligns well with the current trends in higher education like online learning and mobile learning. The continued development of technology only continues to increase the potential of the technology as an interactive and exciting learning pedagogy.

Digital Game Based Learning in Higher Education

Educational games are not new a new concept. Prior to electronic games teachers used game play as a means to engage students in learning. For example, students have recreated games like Jeopardy or Monopoly on poster boards as a means to transfer knowledge. Learning through games is based on performance epistemology and is a learning process based on doing. Electronic games are not new, however the transformation of this industry due to the development of new technology has been astonishing. Dr. Edward Uhler Condon at the New York World's Fair presented the first "game machine" in 1940, however it was decades before a commercial machine was available. The Magnavox Odyssey was released in 1972 followed closely by the Atari game system. Atari was responsible for the subsequent explosion of electronic gaming industry. In the 1980's personal computers with their much faster processers gave the video game industry a tremendous boost. Atari's first electronic video game was called Pong and was a simple game of Ping-Pong. Pong was a hit and found in homes and at multiple business enterprises like as taverns, bowling alleys, and shopping malls. The ability to download games came in 1982 when William von Meister used modem-transfer technology that relied on fixed phone lines. For the first time gamers were able to download games online. It was in 1995 that Nintendo made downloading games through satellites available. Online gaming came into the modern era when Internet capabilities grew to lightening speeds. According to the 2016 report put out by the Entertainment Software Association, 63% of American households play video games regularly and of those who play frequently, 51% play multiplayer games at least

weekly. Of those who play most frequently, 75% believe that playing games provide mental stimulation or education ("Essential Facts About the Computer and Video Game Industry," 2016).

Digital Game Based Learning (DGBL) is defined as the "marriage of educational content and computer games" (Prensky, 2007, p. Kindle Location 3080). When considering DGBL in a higher education curriculum, there are two overarching concerns; the educational design of the game, and the implementation of the game into the curriculum. This literature stream will discuss the pedagogy as related to DGBL, followed by a discussion of curriculum integration and current use in higher education.

DGBL Pedagogy

Game based learning provides motivation and active learning (Whitton, 2011), and research on the development of educational games that integrate learning with video gaming technologies is increasing (All, Nuñez Castellar, & Van Looy, 2016; Qian & Clark, 2016; Tsai, 2013). Games provide engagement, application and effort, and have the ability to increase retention and course completion rates (Moylan et al., 2015). Erhel and Jamet (2013) conducted two experiments that showed DGBL could promote motivation for learning providing that the design contained "features that prompt learners to actively process the educational content." It is important that educational games are well-designed and have clear learning goals, use a scaffold approach, and give the player a sense of autonomy while providing engagement in abstract concepts through an interactive platform (Foster, 2008). In addition, the inclusion of uncertain outcomes, ensuring the game is challenging, providing feedback and elements of curiosity and fantasy will promote an intrinsic motivation for learning (Foster, 2008). The inclusion of games

into a curriculum is not to be approached as a 'one size fits all' as is explained by the statement

of James Paul Gee, a Professor of Literacy Sciences at Arizona State University. He stated:

> Look, print gave rise to the worst educational tool ever made— the textbook. Why is it so
>
> bad? We wanted to standardize learning and bring it to scale. We wanted to use it to teach
>
> everything. If we get the same attitude about games, we'll just be recreating the same
>
> problem as we had with the textbook (Chaplin, 2014, p. Kindle Location 417).

The idea behind using games for learning is that games are motivational for most people.

However, all formal learning should have a foundation in learning-theory and DGBL is no

exception. The is evidence that DGBL can be highly effective when used properly in accordance

with suitable and effective pedagogies (de Freitas, Ott, Popescu, & Stanescu, 2103). There are

many different game types available and a wide range of pedagogy that they can be situated in.

Resistance to incorporating DGBL into higher education can be overcome by connecting

accepted pedagogy and game design.

Behaviorism. Behaviorism is founded in the work of Edward Thorndike and Ivan Pavlo

in the early 1900's. The theory puts forth that learning occurs through stimulation and

reinforcement and is evidenced through changes in behavior through a direct or programmed

instruction and direct observation. Games that use this approach include drill and practice style

of learning such as those that may be used in Mathematics or English. Games that use this

approach have been found to be beneficial (Yip & Kwan, 2006), however other researchers

caution that learning may be lost because the motivation is generally extrinsic and based on

gaining top scores (Kiili, 2005) rather than intrinsic in nature. Yip and Kwan (2006) who

implemented an online game to teach vocabulary concluded that the game provided positive

reinforcement and reported the students preferred the online game to the traditional teaching

because it was more fun. Importantly, they concluded both quantitatively and qualitatively that the learners retained the vocabulary for a longer period of time and could retrieve more words than those who only attended face-to-face classes.

      Cognitivism. The second learning theory, Cognitivism is rooted in the belief that learners attempt to explain the world around them and determine cause relationships. Using an active learning, the instruction should be tied to the learner in a meaningful way and that learning should be structured from simple tasks to more difficult tasks. Simulation games are games that can be used for training purposes and place the learner in an artificial environment that mirrors the real world. In these games, learners focus on decision-making exercises and the outcome of those decisions with the hopes of translating to the real world. Simulation games for laboratory sciences have been shown to be as good as the traditional experience in preparing students (Garside, 2009; Makransky, Thisgaard, & Gadegaard, 2016). Garside (2009) reported that the use of a simulation game among second year nursing students was a productive learning strategy that not only increased theoretical knowledge, but also boosted confidence and linked theory to practice. It would be difficult with the current technology to produce an online learning game that makes the learner feel that they are actually present. As stated by Lombard and Ditton (1997) the importance of presence is already clear to those who design and use media technologies. According to the September 2016 Healthcare/Medical Simulation Market by Product & Services report, growth in the global healthcare/medical simulation market is expected to grow from 1.12 billion to 2.27 billion between the years of 2016 to 2021, and a significant share of this growth is attributed to simulation based learning in medical/nursing schools.

Humanism. Humanism centers on the thought that learning should be personalized. "Humanism involves experiential learning…requires no teacher and relates solely to the meaning-making process of the individual's direct experience" (Wu, Hsiao, Wu, Lin, & Huang, 2012, p. 267). Pedagogy that follows a humanism decree would drive a learner-centered self-actualization education. In other words, in game play learners would be able to modify the rules or game narrative to personalize play. Game designers can not create a personalized game for every learner but they can make games customizable so that the learner can select their preferences by using adaptive technologies (Göbel & Mehm, 2013). One example of an educational game that applies the humanism theory is the microbiology based game 'S.C.R.U.B' (Magerko, Heeter, Fitzgerald, & Medler, 2008). Not all players have the same player types or play style (Heeter, 2008). The game incorporates adaptive features to accommodate different player types and styles and thereby enhances the learning experience based on persona.

Constructivism. Constructivism focuses on socio-cultural contexts, social interactions and constructing knowledge. As a social process the learning is not limited to the individual but instead focuses on the social interactions for constructed learning. For example, an alternate reality game (ARGs) that "allows players and educators to interact in a learning environment where players construct interpretation and meaning" and "learning is weaved throughout the game to create an alternative way for learners to gain knowledge and understanding of a subject matter" (Lynch, Mallon and Nolan, 2014). Games that align with constructivist learning allow the student to draw conclusions through creative experimentation or constructing their own games rather than embedding "lessons" directly into games (Kafai, 2006). An example of the 'what if?' game construction is Roller Coaster Tycoon where the player is required to build roller coasters to different specifications and manage the business of the park.

The meta-analysis work conducted by Wu et al. (2012) determined that the majority of DGBL studies considered the humanism and constructivism approach to the design of DGBL. Additionally, they found that researchers leaned toward the contemporary learning principles associated with the more popular theories: experiential learning (humanism), situated learning theory and problem based learning (constructivism). Multiple digital games designs that offer varied pedagogic frameworks that may be suitable for higher education learning are available.

Adult learning theory. When designing or implementing games for higher education, particularly graduate level education, the choice of the game should consider adult learning theory in addition to the pedagogic attributes of the game. Adult learning theory put forth by Malcolm Knowles in 1969 had it's roots in the publications of the Journal of Adult Education between 1920 and 1948, books including one of his own during the 1950's and finally scientifically designed research focused on adult learning in the 1960's (Knowles, 1970). According to the adult learning theory, adults learn differently than children and thus this will have implications for the used of DGBL in higher education. There are six main characteristics to adult learning as follows: a) adult learning is self-directed/autonomous b) adult learning utilized knowledge and life experiences, c) adult learning is goal oriented, d) adult learning is relevancy-oriented, e) adult learning highlights practicality, and f) adult learning encourages collaboration (Pullagurla, 2014). DGBL has the potential to satisfy each of these characteristics provided the game design or choice is appropriate and matched to the learner and their environment. Adult learners have a diverse background in digital gaming and are unlikely to have experienced DGBL in their K-12 education. If adult learners do not understand the process of the learning transfer through games, the value of the learning is questionable. Adult learning theory stresses that learning activities must be designed with a specific purpose for adult students

to become engaged. Students in higher education have to be convinced that learning through games is "the most effective way to learn something" (Whitton, 2010, p. 40). Without understanding the framework in which the learning will occur, the game designs, pedagogic approach and context in which the DGBL may be mismatched resulting in a devaluation of the DGBL approach and wasting of valuable time and resources. DGBL has many key attributes that when designed and applied appropriately, could increase student motivation, attrition rates and add to the quality programs. The instructional setting will determine the best strategies for effective teaching and assessment using games.

Curriculum Integration of DGBL

Technology and the Internet have changed the way the world interacts and many scholars have proclaimed the need for new skill sets to meet 21st century challenges. Although, many educational infrastructures have so far remained unchanged, there is a strong movement toward redesign of the current approaches to education. Researchers have found advantages to incorporating DGBL into curriculum (de Freitas et al., 2103) as a way to motivate students and provide authentic learning experiences through active participatory learning and engagement. Research by de Freitas et al. (2103) points out that "…game-based approaches fits well into the current structures because they allow users to dip in and out of game experiences, to map curriculum objectives against game elements such as missions and quests, but centrally because they engage and motivate young and older learners." (p. 14). Learning environments that integrate distance learning may require, by their very nature, high levels of student motivation. Therefore, incorporation of DGBL may prove to be a valuable learning technology to increase the student's intrinsic motivation by learning through an activity that is enjoyable yet challenging. Today's educational curriculum designers and faculty should be thinking redesign

by "…considering GBL from multiple perspectives and effectively utilizing it with challenging subject matter, [as] a compelling case emerges for its more widespread inclusion in higher education" (Moylan et al., 2015).

Before implementing DGBL, it is reasonable to first understand the framework and learner base of that environment prior to deciding on use of a commercial game or designing a new game. A similar perspective by Shah and Foster (2014) took an ecological approach that considers the fit between the innovator, the innovation and the school context to investigate the conditions necessary to implement a game based learning course in a K-8 school that taught systems thinking. The researchers conclude, "effective game integration requires educators to be able to decipher the relationship between a game, the achievement of curricular goals, and its fit within the school context" (p. 38). Thus it is important that instructors to consider all three of these interconnected settings for successful implementation. The importance of the educators connectedness to the game is reiterated by Noraddin and Kian (2015) who state "adoption must begin with understanding the teacher's thinking about digital games" (p. 156).

Off the Shelf vs. Custom Designed

DGBL comes in many levels of technological sophistication (Prensky, 2001a) and there are many choices for faculty interested in implementing games. "The successful adoption of game based learning in education will depend on whether stakeholders in the education arena are able to critically discern the state of the enterprise" (Prensky, 2007, p. Kindle Location 3080). There are commercial games that educators can purchase off the shelf and although they may provide limited options, they can be modified for use within a specific discipline or to achieve a specific learning goal. Purchasing commercial games has many implementation benefits such cost savings, and online support and manuals. An example of this was presented earlier in Roller

Coaster Tycoon, a game that is sold for entertainment but can be adapted for use in an engineering or business curriculum. Although the game is designed for entertainment purposes and does not require physics based problem solving, the instructor can have the student take on the role of the engineer or manager and produce safety reports, including force tolerances, structural integrity, speed estimates, or weight capacity and limits (Van Eck, 2006). The integration process of Roller Coaster Tycoon was documented by Foster, Katz-Buonincontro, and Shah (2011) who found that physical infrastructure, instructor knowledge, supports and classroom management were all key factors that contributed to successful implementation. Commercial games are widely available for K-12 education, however as the level of education and field specialization increased, fewer games are available and less is known on the integration process.

As educational games increase in popularity, there are more options available for purchasing games designed for specific educational purposes. Webb et al. (2015) conducted a case study on the implementation of a purchased game, *Virtual Walking the Pens*® into a high school introductory animal science course. The game is a simulation that allows students to experience the outcome of the decisions they make in animal treatment and environment management. The instructors attended a 2-day professional development seminar prior to implementing the game. Constraints to the implementation focused primarily on the technological aspects of the game such as glitches in the software and Internet connectivity issues. Issues also arose in the pacing of the game and flexibility with time. The instructors found the instruction material included with the game a valuable resource. One participant remarked about implementing the game:

One thing about [implementing the game] is it really kind of opened my mind to different things and showed that I get too comfortable with PowerPoint and lecture… I think for me, I kind of had to give up the comfort zone in being in control all the time with allowing them to play the games, but as I got over that I realized that's actually more beneficial [to students] (p. 894).

Higher education faculty may find it difficult to find an appropriate purchased game to teach their content leaving instructors to designing their own games. For faculty without game design training, there are still other choices to consider. Lower end cost options can be using game templates that are prebuilt using recognizable formats (board games, Jeopardy). "Although game templates are one of the simplest and most primitive forms of Digital Game-Based Learning, the power that they have to liven up a classroom and get people's juices flowing is truly amazing" (Prensky, 2001a, p. 325). Web-based templates are also available that work over the web are similar in that they also are built on well known games and are modifiable to specific course content.

Another option for faculty comes with a much steeper price tag, outsourcing to produce a custom moderate or large-scale project can cost upwards of $25,000 (Prensky, 2001a); Prensky (2001c) suggests the following criteria be met before considering investing:

- There must be some "content" that management feels is absolutely critical to be learned.
- The "content" or subject matter of the urgent learning needs must be "boring," "complex" or "difficult."
- The population to be trained must be one that is likely to be amenable or susceptible to a game based learning approach.

- There must be a person in the organization willing to push a custom project through all the difficult stages.

- There must be at least one highly placed executive sponsor for the project.

An additional option for designing a custom game is for faculty to collaborate across departments and create games "in-house." However, creating a game that is captivating and at the same time scientifically accurate is not easy. The National Science Foundation in collaboration with University of Southern California put together an interdisciplinary team to create *Immune Attack*, a game that taught immunology concepts to high school and undergraduate students (Kelly et al., 2007). The key to success was construction of an interdisciplinary team consisting of subject matter experts, game designers, and information technology and learning science experts. The success also relied heavily on the ability each team member to place trust in the members from different disciplines. The game designers engaged in deep discussions with the subject matter experts to develop a game design that matched the immune system response. An iterative design process that included prototyping, play testing and revisions followed. The experience led the authors to conclude that "cross-profession collaboration let o project prioritization that ultimately enhanced the game's core concept and usability" (Kelly et al., 2007, p. 49).

A project is currently underway at Drexel University College of Medicine, Philadelphia, PA. The Department of Microbiology and Immunology (M&I) is currently designing a series of games to supplement the curriculum of the various online, hybrid and face-to-face programs the department offers (i.e., MS and PhD). The first mini-game in development will teach graduate students HIV entry into cells (Brown, 2016), a topic taught across multiple courses offered by the department to graduate and medical students. To achieve this game development goal an

interdisciplinary team was built (i.e., the Center for Business and Program Development). The team consists of a department faculty director, post-doctoral fellow who is scientist game designer, a graduate student conducting research in DGBL, an undergraduate student who is a programmer, an instructional designer, and an academic coordinator. The team works closely with subject matter experts in the department, DGBL researchers at Drexel's School of Education, and game design and development experts at Drexel's Westphal College of Media Arts and Design. This approach requires a major investment of departmental and institutional financial and human resources, but it offers an opportunity to develop customized games to meet the curricula's specific learning goals. It is also an approach that helps advance the University's mission of education, research and collaboration at different levels of training (i.e., undergraduate, graduate and post-graduate).

There are many considerations for faculty interested in being creative and implementing game based learning into their higher education curriculum. According to *The Horizon Report: 2014 Higher Education Edition*, games and gamification are likely to impact the higher education classrooms, both traditional and on line in the next two to three years (L. Johnson, Adams Becker, Estrada, & Freeman, 2015). There is little evidence of DGBL use in higher education (Ebner & Holzinger, 2007) and the numerous decisions that face faculty and their institutions when implementing DGBL can be overwhelming, resulting in underutilization of a valuable learning resource. Therefore, this current research proposal will explore in detail the experiences of early adopters of DGBL.

Summary

This chapter presented three literature review streams that are important to understanding the framework of this study and the basis of the key questions. Implementing DGBL into

curriculum requires a dedication of time and effort by the faculty. Higher education is undergoing a technology transformation that requires the innovative and creative efforts of faculty to perpetuate an environment of learning that is appropriate for 21st century learning.

Chapter 3: Research Methodology

Introduction

The purpose of the research was to examine the experiences of higher education faculty that are early adopters of DGBL in higher education programs. Institutions of higher education are implementing new learning technologies and many are becoming commonplace, however game based learning is still a new frontier in higher education. There are many decisions to be made by faculty that wish to employ DGBL, and include deciding if DGBL is a pedagogical method that personally suits the faculty, their coursework and their institution's innovative platform. Thus the experiences of those who have paved the way will provide a valuable source of information from which mid-level adopters can make informed decisions. To provide an in-depth look at those experiences, this study employed a multiple case study methodology and gathered data through interview and artifact collection. The following research questions served as prompts to the researcher as a reminder of the data that needs to be collected (Yin, 1994) and are illustrated in Figure 2.

1. What was the basis of the faculty decision to implement DGBL?

2. How do instructors balance the effort required to implement DGBL with their workload and academic responsibilities?

3. How did added support (or lack of) influence the faculty experience when implementing DGBL?
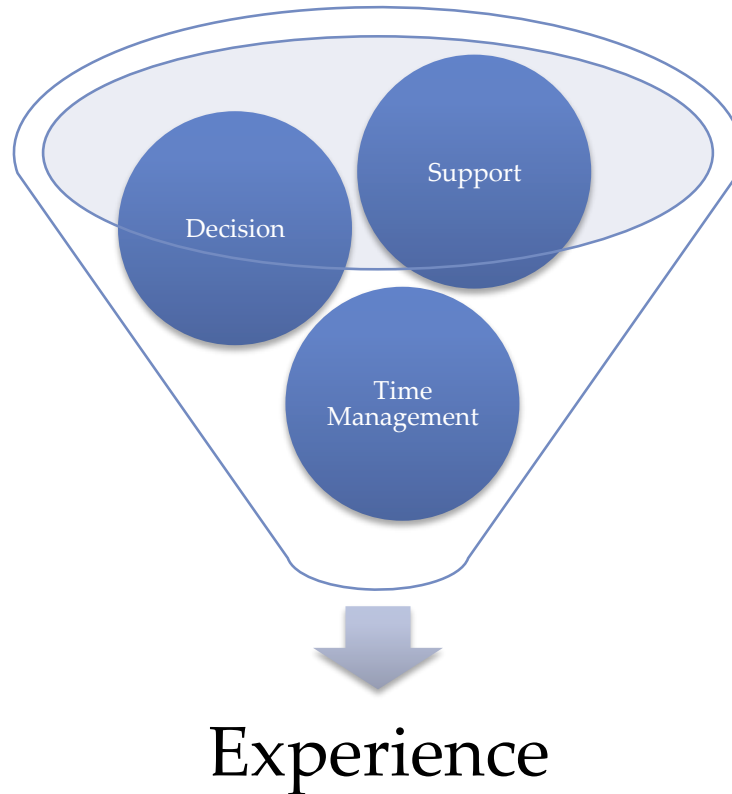
Figure 2. Relationship between research questions and faculty experience.

This chapter details the explanatory multiple case study research design that was used to best answer the key questions, explains the rationale of the design and describes the site and population. It concludes by describing the research methods, the data analysis procedures and ethical considerations specific for this study.

Research Design and Rationale

A qualitative explanatory case study was conducted to understand the experiences of higher education faculty that implemented DGBL into higher education coursework. "Qualitative research includes an understanding of context, circumstance, environment, and milieu…in all its real world complexity" (Volpe, 2016, p. 37). In addition, qualitative research is appropriate when the inquiry is from the perspective of the research participants and seeks a deep

understanding of an activity and seeks a range and variation in the findings through a purposefully selected small sample set (Volpe, 2016). The case study approach was an appropriate choice to answer the questions addressed in this study. Explanatory case studies generally contain "how" questions because these types of questions deal with processes over time (Yin, 1994). Guided by open-ended questions, this study encouraged the instructors to describe their experiences throughout their work implementing DGBL.

This research followed the post positivist approach as described by Yin (1994) that answers the ontological question on the nature of reality, by maintaining that the nature of reality is objective and predictable. Prior to this research, the researcher believed that the experiences of the faculty would be reflected their motivations, effort, personal traits and beliefs, and the quality and type of the support that they received prior to and during the implementation process. The epistemology or the relationship between the researcher and the research was also aligned with Yin's (1994) representation of case study in that the researcher remained detached and independent to better obtain meaningful experiences of the events. However, the methodology for this study also aligned with Stake (1995, 2005) in that the methods were flexible and used a minimal conceptual framework foundation. This research explored the faculty's experience with implementing DGBL and sought to understand the profoundness of their personal experience. In this regard, the methodology aligned with Stake (1995, 2005) in that multiple perspectives and viewpoints were recorded to obtain a holistic understanding. A goal of this researcher was to understand the whole of the faculty experiences and the factors that contributed meaningfully to them. Stake (1995) discusses the role of triangularity in identifying divergent experiences, while Yin (2003) has described the role of triangularity in finding convergent experiences. The

researcher applied both theorists' views of triangulation in this collective case study approach, and both divergent and convergent experiences were explored.

The results of this study will provide a source of learning to faculty deciding to integrate DGBL into their courses based on the experiences of their peers. Thus, the qualitative case study was appropriate because according to Yin (1994) we often recognize the relevance of the cases studied to our own situation when the audience is in the same field. This research brought a vividness and detail that is not generally presented in other formats, but is typical of a case study approach (Marshall & Rossman, 2010). Finally, this case study was collective in nature (Stake, 1995) and examined the experiences of more than one individual. Case study is described as an appropriate method to understand "an event, activity, process, of one or more individuals" (Creswell, 2015, p. 481).

This study addressed validity through triangulation by using a maximum variation strategy. Maximum variation in case studies allows for representation of diverse cases and the presentation of multiple perspectives about the cases (Volpe, 2016). According to (Creswell, 2015) one method of triangulation "is the process of corroborating evidence from different individuals" (p. 259). Multiple interviews from higher education instructors across many academic disciplines and universities were conducted in an attempt to capture a wide range of experiences. By intentionally looking at a heterogeneous population, this researcher discovered a wide range of experiences with potential to influence an equally diverse population of faculty considering implementing DGBL into higher education courses. Additionally, support staff was interviewed to substantiate and corroborate the perceptions of the faculty when available.

Site and Population

Population Description

The inclusion requirement for the faculty participation in this multi-case study was that the participant was employed full time at an institution of higher learning that offered advanced degrees in accredited program. There were no restrictions to the faculty discipline or graduate/undergraduate teaching status. The only criteria was that they were lecturers with one or more years experience and have implemented DGBL in their coursework. The participants were selected through a purposeful sampling method followed by a snowball recruitment strategy. A purposeful sampling method as described by Creswell (2015) is a deliberate selection of participants and sites to understand a specific or central phenomenon. The purposeful sampling strategy allowed for the selection of faculty with unique experiences from different universities, different disciplines and different types of games. The participants were found through a search of literature that identified higher education faculty who published on DGBL in higher education and were contacted through the corresponding author email listed on the publication. The snowballing strategy was employed by the researcher after participant recruitment and was a method to increase participation by asking participants to recommend other faculty for the study (Creswell, 2015). A desired outcome of this study was to produce a maximal variation in perspectives and experiences. The sample size planned for this study was limited to eight faculty and related support staff when available.

The inclusion criterion for additional support staff was the employment by the corresponding faculty's institution of higher learning or a professional subcontract agreement during the game implementation process. There was no restriction on the employment being full time/part time, or permanent/temporary. All support participants directly or indirectly assisted

the instructors and were identified during the faculty interview. Criteria that would have caused a source of support to be excluded from the study include an informal capacity such as a friend providing advice or they hold competing interests that are of a financial or personal nature.

Site Description

There was no single site. Faculty participants were from multiple universities within and outside the United States. Each individual site met the accreditation standards for an institution of higher learning of their country of origin and offered advanced degrees. All interviews were held via the Internet using the synchronous meeting tool Zoom.us.

Site Access

Each faculty and support staff accepted an invitation to participate. Faculty choose to share access and availability to artifacts. An informed consent for was sent to each participant (Appendix A) via email prior to the interview and artifact collection. Permission to record the interview was obtained verbally prior to the start of the interview.

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Research Methods

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The primary data collection method of this study was interview. Twenty five years of creativity studies has lead Sternberg (2002) to the conclusion that although there are many differences between creative people, there is one key attribute that they share, and that attribute is the *decision* to forge their own path and see their vision through. Therefore, a primary focus of the interview discussion was to understand the faculty's decision to become an early adopter of DGBL in higher education. As previously stated, and according to Sternberg (2002), "for creativity to occur, it must be preceded by a personal decision to think and act creatively, with all the risks attendant on doing so" (p. 376). In addition, interviews were used to gain an in depth understanding of the faculty work environment and the personal traits of the faculty, in response

to the second and third essential questions of this study. A supportive environment and personality traits have been implicated in creative functioning including the "willingness to overcome obstacles, willingness to take sensible risk, willingness to tolerate ambiguity and self-efficacy" (Sternberg, 2006, p. 7). The studies qualitative open ended questions were guided by the creativity quantitative studies of Zhou and George (2001). The interview process, described in the next section, was preceded by the game artifact collection. The game implemented by each study participant was evaluated by the criteria described in the following sections. It was important to consider the complexity and time constraints put forth by the different digital games to better understand the effort required by the faculty and their individual experiences.

Description of Method(s) Used

    Interview. A major benefit to using interviews is the ability to collect in-depth data reflecting a that person's perspective of an specific phenomena (Creswell, 2015). The interview was conducted as described by Yin (1984) and used a predetermined list of open-ended questions to guide the discussion that allowed each of the participants to expand and portray their individual experience. The interview protocol contained the base structure of questions to ensure data collection that will answer the core questions. Each individual interview was treated as unique and therefore the interview process its self varied between participants to gain an understanding of each special case (Stake, 1995). The interview sought to extract specific stories, events and experiences unique to the participant and their case. The researcher conducted a primary interview with each faculty that was expected to last no more than one hour. Due to the nature of interviews as being verbal reports and subject to poor recall, or inaccurate articulation, this research used the strategy suggested by Yin (1984) to "corroborate interview data with information from other sources" (p. 85). Therefore, using the snowball approach previously

described, this research sought support staff that played an active role in the implementation of the faculty participant's digital game. When support staff was available, the interview followed the primary faculty interview within a two-week window. The order and topic of these interviews is listed in Table 1 and the interview protocols are provided in Appendix B (faculty) and Appendix C (support staff).

The questions in the case study interview protocol were designed to elicit responses at a single case level even though it is part of a multi-case study, however the analysis was at the single and multi-case level as described by (Yin, 1994). Interviews were conducted and recorded using Zoom, a synchronous online software package. An additional second recording was obtained using an iPad (Apple Inc.). The researcher was in a private office during the interview to protect the privacy of the interviewee.

Table 1. Interview data collection method.

Interview	Broad Discussion Topic
Faculty 1st	Introductions. Decision to implement DGBL. Personal creative traits, motivations and drive that inspired the early adaption of DGBL. Faculty workload management during innovative process. Faculty experience with staff and administrative support. Overall experience with being an early adopter of DGBL in HE. Invited comments of the faculty choice.
Support Staff	Role in the decision to implement DGBL. Type of support supplied to faculty. Interest level of the support staff in DGBL. Self-described expertise level of the support staff in DGBL. Role of support staff during the implementation process. Extent of the involvement in the innovative innovation. Invited comments on the innovation.
Faculty 2nd	Will occur post data analysis of 1st round interview for further inquiry of trends that surfaced during the analysis.

Game based artifacts. Artifact collection consisted of the games that the instructors used in their classroom. The games were examined for constructs that contributed a layer of complexity when implementing and a direct affect on the instructor's experiences with the game. First it was established if the game was purchased or created (in-house, out-sourced). A game that is purchased will require company support for implementation and use, while a game that is developed in house will require a different support strategy. A study by Brom, Šisler, and Slavík (2009) found that an important consideration in DGBL implementation is support to instructors. Therefore, the researcher collected information on the source of the game and all forms of support that was provided, including manuals, handbooks, instructor aids, technical support (IT) options and any additional support as uncovered by the study when available or accessible.

Information was collected as to the context in which the game is used. For example, the game can be thought of as didactic in that its implementation may be formal in class instruction or an informal study aid (Burton et al., 2011). Additional information that will be extracted from the game will be the game type using descriptors (board, virtual reality, card, matching, role playing), and delivery systems or game platform using descriptors (android, apple products, computer, CD ROM online synchronous/asynchronous), and the location of the game play (home, school) will be collected and considered in each case. A summary of the game artifact collection is presented in Table 2.

Table 2. Game artifact collection.

Source	Purchased	Developed In house or Out-sourced
Game Support	IT (in house)	IT (in house)
	Peer	Peer
	Instruction booklet, manuals	Other
	In game tutorial	
	Online help	
	Other sources	
	Instructor aids	
Instruction Type	In Class/ At Home	In Class/ At Home
Game Type	Descriptor	Descriptor
Player	Single/Multi	Single/Multi
Delivery System	Descriptor	Descriptor

Data Analysis Procedures

A goal of this collective case study was to understand the experiences of faculty that have implemented DGBL into higher education curriculum resulting in descriptive data. The preferred data analysis strategy according to Stake (1995) is to "follow the theoretical propositions that led to the study" (p. 103). Hence, the interviews with the faculty were considered the primary descriptive data analysis and the interviews with the support staff and the game artifact collection were considered secondary and supplementary to the faculty data. All interviews were professionally transcribed, and read and re-read to gain an overall sense of the content. The data was initially coded using the NVivo software. Coding the data provided a means to organize and make connections, better comprehend the data and was a means of data reduction (Miles, 1994). Data reduction, the first step in the data analysis began during the collection period. Figure 3 shows the flow of data analysis as presented in Miles (1994, p.10).
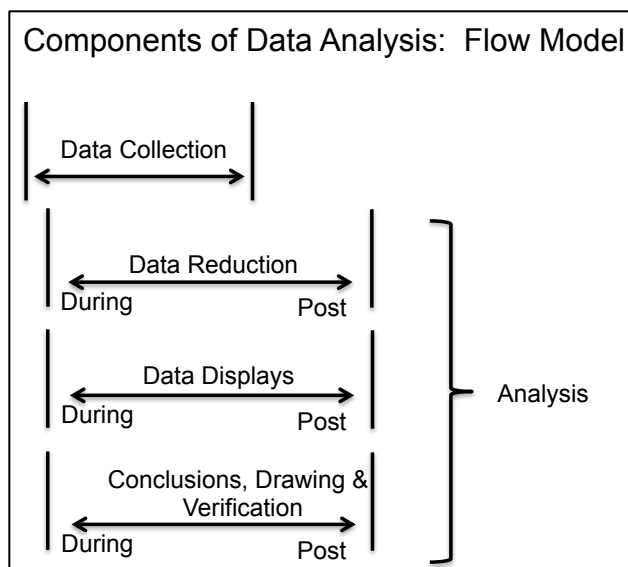
Figure 3. Data analysis flow diagram.

Case study relies on two strategies to extract meaning, "direct interpretation of the individual instance and through aggregation of instances until something can be said about them as a class" (Stake, 1995, p. 74). Each case in this study was analyzed independently. The individual experiences of faculty that considers their individual creativity, motivations, support structure and time management strategies as part of the whole collection of the case data was thoroughly examined. Each individual construct of inquiry, as noted by the key questions of this study, and the related experience described by the participant was analyzed using an explanatory effects matrix to display the data, in accordance with the second step of Miles's data analysis flow model. The explanatory effects matrix is useful tool for discovering emerging trends of causality and making comparisons and contrasts (Miles, 1994). Appendix D provides the explanatory effects matrix used for the participant's gamer profile. Appendix E provides the explanatory effects matrix that was used for the cross analysis research of the participant's game profile.

This study conducted an analysis of the multiple cases using a cross-case display that allowed ordering and explaining the data by comparative analysis. Step 3 of Miles's data analysis flow model is to draw conclusions and verification. To strengthen explanations through multi-case cross analysis, the researcher must understand the dynamics of the cases on an individual basis prior to attempting to create a cross-case explanation.

Stages of Data Collection

The proposed study was defended on November 15th, 2016. The IRB was approved on January 23, 2017. Recruitment began immediately following the IRB approval and continued into February. Interviewing began on January 30th and was completed March 10th 2017. Through out the months of February and March 2017, the data was transcribed, read and analyzed simultaneously with the data collection, as suggested by Creswell (2015). Follow up interviews were deemed unnecessary. Chapter 4 & 5 were written in March and April of 2017. Chapters 1, 2 and 3 were edited in April and the final components of the manuscript (abstract, tables, figures), and the final edit were completed in May of 2017. A detailed explanation of the researcher's approach to time management is presented in Figure 4.
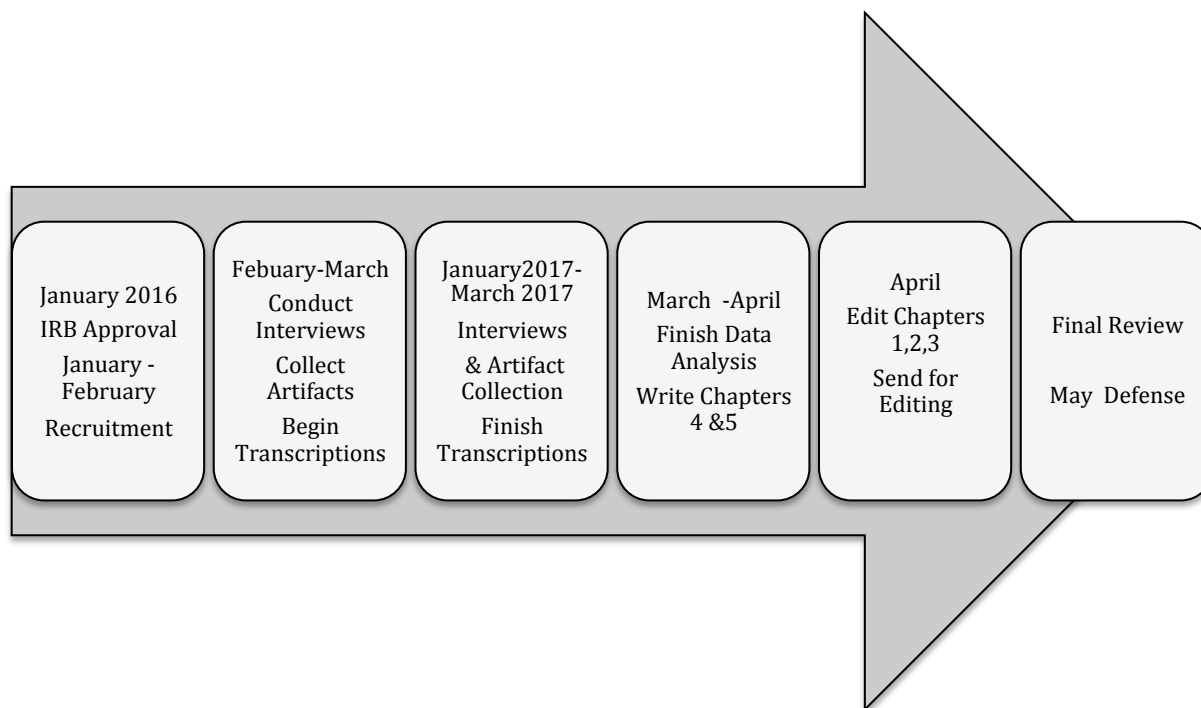
Figure 4. Six steps to completion.

Ethical Considerations

The researcher completed the required Learner Group Specific online Collaborative Institutional Training Initiative (CITI) human subject online training program and received IRB approval through Drexel University. The semi-structured interview protocol contained minimal risk to the participants and the research was eligible for an expedited review by the IRB board.

With a qualitative interview research design, the subject's replies are the primary source of risk to the participant. The participants were provided an informed consent that detailed the purpose of the study, the voluntariness of their participation, the extent of their commitment, and the protection of their anonymity and confidentiality. Each participant was given a pseudonym to protect identity. Interview recordings and transcripts were kept in a secure encrypted file in a locked file cabinet. Data was kept in a digital format only and the researchers listed on the IRB were the only persons with access to the data. Keeping the data on a separate device from the

participant identifiers further protected confidentiality. There were no any incentives for participating in the interview.

Chapter 4: Findings, Results and Interpretations

Introduction

This chapter provides the data collected through out this research study. It has been

organized into three main sections, Findings, Results and Interpretations, and concludes with the

Summary. The Findings section begins by providing a description of the study participants and a

gaming profile, followed by a narrative for each participant. In vivo evidence for the narrative

has been provided in Appendix F. The Results and Interpretations section defines and explains

the coding procedure used to analyze the data, followed by a discussion of the emergent themes

revealed by the research. The Summary section concludes this chapter by providing an overview

of the key finding and the results of this study.

Findings

Participants

The researcher conducted online interviews using the online meeting software Zoom.us

with six faculty participants and two instructional/game design support staff. The researcher

interviewed the faculty instructor prior to their corresponding support staff. All interviews were

conducted separately and were not discussed with other interviewees. The researcher followed

the interview protocols listed in Appendices A and B. The participant professional profile is

provided in 3. Six faculty instructor participants represented institutions that included a two-year

community college, two universities, and three medical schools. Two support staff participants

were interviewed and included one instructional support staff and one game designer with a

faculty appointment. Table 3 provides the pseudonym assigned to each participant, university

position, discipline, academic rank, and the level of instruction. The criteria required to

participate in this study has been previously described in the Materials and Methods section of this manuscript.

Table 3. Participant professional profile.

#	Participant Pseudonym	University Position	Discipline	Academic Rank	Grade Level
1a	Dr. Trainer	Faculty	Literature/Classics	Tenured	B
1b	Dr. Stevens	Support	Instructional Designer	Assistant Professor	N/A
2	Dr. LaDuke	Faculty	Medical	Tenured	G
3a	Dr. Brunkard	Faculty	Medical	Associate Professor	U
3b	Ms. Steel	Support	Game Developer	Senior Staff	N/A
4	Dr. Pekala	Faculty	Math	Assistant Professor	U
5	Dr. Murphy	Faculty	Linguistics	Assistant Professor	U
6	Dr. Lee	Faculty	Medical	Associate Professor	G
*Teaching Profile: (U) undergraduate, (G) graduate, (B) undergraduate and graduate, (N/A) support personnel. * a and b designations represent a team comprised of the faculty (a) and support staff (b).					

A game profile was created for each participant (Table 4) that includes the current state of the game use, type of game used, game setting (in class, online), game context (full course, in class activity or class supplement), and the source of the game (developed in house, online commercially available licensed template or outsourced to professional developer). All games were all designed for computer delivery. Two games used licensed online game templates that were personalized using the subscriber's content, one of which was used for in class activities and one that was used to deliver the entire course content. Three digital games were developed in house, one of which was used to supplement course material, one that was used as an in class activity, and one that delivered the entire course content. The game developed in-house that delivered the entire course content was distributed through the Blackboard Learn LMS. The one game was outsourced to a professional development company was a 3D digital video game that

required additional expertise and cost to implement due to the 3D landscape that allowed the

player to move in at least two axial directions. Also included in the faculty game profile are the

funding sources designated for the explicit use of game development and include those received

from the university (internal) or from external sources (funding agencies). Lastly, the game

profiles include the perception of the faculty as being a self-described "gamer" and if the

decision to implement games was faculty led (bottom up) or administratively led (top down).

Table 4. Faculty participant game profile.

	Participant Pseudonym	Game Use	Game Type	Setting	Context	Game Source	Funding Sources	Self Described "Gamer"	Decision To Implement
1a	Dr. Trainer	Currently in use	Role-Playing	Online	Entire Course	In house	Internal & External	Yes	Bottom up
2	Dr. LaDuke	Currently in use	Multiple	In class	In class activity	Licensed online template	Internal	Yes	Bottom up
3a	Dr. Brunkard	Currently in use	Quest	Online	Entire Course	Licensed online template	External	No	Bottom up
4	Dr. Pekala	Currently in use	Multiple	In class	In class activity	In house	Internal	No	Bottom up
5	Dr. Murphy	Currently in use	Drill and Practice	Online	Supple-mental	In house	Internal & External	No	Bottom up
6	Dr. Lee	Not currently in use	Role-Playing	Online	Supple-mental	Out sourced	Internal	No	Bottom up

Participant 1a: Dr. Trainer Faculty Instructor Narrative

Dr. Trainer is a tenured professor in at a liber arts and sciences college that is part of a

large university in the Northeast region of the United States. Dr. Trainer in an expert in his

literary field as demonstrated by an extensive publishing history. Additionally, he has published on the development and classroom use of the games he developed to use in his higher education courses. Dr. Trainer has been the recipient of many awards, including awards that have honored his innovation and excellence in distance learning. He has held several workshops and mini-courses aimed at improving teaching practices. The game that Dr. Trainer uses was developed in-house with the assistance two graduate students, both of whom were tabletop role-playing gamers as well as frequent massive online multi-player gamers. Dr. Trainer's approach was interdisciplinary and he worked with colleagues from the School of Education during the development. He described his game as digital only in that it is offered online. Dr. Trainer's game approach was to create a game that covers the entire content of the course. Dr. Stevens, a graduate student of Dr. Trainer who assisted in the creation of the game, is also a participant in this study.

Decision. Dr. Trainer described himself as the "actor type" who loves performing. But he became "disillusioned with the lecture model" and thus felt the students should step up onto the learning stage. Game based learning was a method to allow that. Admittedly, there is a huge learning curve for students, but it was well worth the effort to keep the students engaged in the learning. Dr. Trainer strongly felt that,

> Something that had to change, and one of the things that I wanted to change, was the instinctual feeling despite all of the advances that have been made in secondary education, the instinctual feeling that my students seemed to have, that somehow sitting in a seat in a classroom, or even eventually not sitting in that seat in the classroom, allowed them to learn just because at the end they got a grade by cramming for an exam.

Dr. Trainer chuckled when asked if he considered himself a "gamer." He has played games since the original Magnavox version of Pong, but because he doesn't consider himself to be a highly skilled player, he hesitates to call himself a "gamer." He expressed his dismay at the term "gamer" having taken on negative connotations and continuously works to "reclaim it for people who enjoy playing games." He credits the period in his life during his adolescence when he was an avid player of *Dungeons and Dragons* as being hugely important to his current interest in DGBL. Dr. Trainer continued to be captivated by the storytelling that was embedded in games when he began playing Halo2 and "that developed into a purely literary and kind of humanities based research interest in connections between ancient epic and philosophy and modern digital games."

Dr. Trainer's interest in educational games was fueled by his observation that storytelling was an integral part of games and the impromptu attendance at a presentation by an educational game designer. The presentation was responsible for an "epiphany moment" and had a huge impact on his valuation of games in education. Having had little exposure to educational psychology and pedagogy in his formal training, the presentation represented a pivotal turning point for his consideration of gaming and the need to "broaden our understanding of what kind of learning could go in games." Dr. Trainer began attending game based learning conferences to expand his knowledge of the current research, and become involved in what he perceived as "tremendous excitement" for educational gaming. Dr. Trainer revealed that his "imagination has always outpaced what was possible." However, he believes that creating the game has made him think about the limits of things.

Time management. Dr. Trainer is very fortunate to have tremendous flexibility and attributes much of that flexibility to online education. He explained that the online courses have

not reduced his time commitments, but instead has added flexibility and the ability to modify his schedule to fit into a more advantageous schedule. When online learning became available, Dr. Trainer was very excited about "the potential for designing online learning environment," and "it followed immediately that you could implement game based learning." Dr. Trainer developed the game over the summer months. He described the process as time consuming and requiring dedication. However, his enthusiasm for the project made it enjoyable. He explained, "At the time I was so excited about it that I didn't even realize how much time I was putting in," and in the two months before bringing the game live in his classroom he "probably put in 200 hours." The first run through of the game was in a hybrid classroom format that allowed him to observe the students playing and see what was working and where there were issues. Dr. Trainer favors the hybrid model where the students learn both online and face-to-face. He is also a big fan of using the flipped classroom model where students learn through a prepared lesson during their out of class time and use the face-to-face time to question, discuss and build on the previously viewed material.

Dr. Trainer organizes his time and sticks to a self-created schedule. An early riser, Dr. Trainer begins answering student e-mails as early as 6 am and will work through e-mails until 11 am, although notably he will respond immediately to a student if he feels they are truly distressed and require immediate attention. This allows him to focus on his other obligations, especially his writing, with out constant interruptions and distractions that would occur if he were in a pattern of continued student communication. Game questions were a key contributor to the e-mail correspondence; however, continued reiteration to the game design has resulted in a substantial reduction. Interaction with students is important to Dr. Trainer and he regards his office hours as a sacred contract.

Support. During his tenure-track time, he was excited to begin designing online courses and saw the potential to incorporate games into these learning environments. However, the lack of training in teaching pedagogy during his graduate work left him at a disadvantage. "I did not know what a learning objective was until I was five years into being a tenure-track faculty member." Dr. Trainer with the help of a "wonderful instructional designer" created a matrix that contained the learning objectives and corresponding game activities. He is adamant that his collaboration with instructional designers, and their approach to the game from an educational psychology point of view, was instrumental to the success of the game. "If you want real game based learning, the victory condition of the game and the learning objective have to be the same", he explained. Two Department of Education graduate students assisted Dr. Trainer in the educational design of his game. They provided a "grounding in theories of situated cognition" that "had a very decisive impact" on the game design. An interview with Dr. Stevens is presented in this study and provides greater insight into his role. Additionally, Dr. Trainer's institution is home to a Center for Excellence in Teaching and Learning that provided additional support to his game design. He found his department very supportive and stressed the need for support by stating that he "probably would have stopped after a year or two if I hadn't had the support and shared interest of colleagues." Dr. Trainer would like to see the creation of a game lab that would contribute to the implementation and growth of gaming at his institution. Additionally, he invites the opportunity to interact more with digital media students who could participate in game develop and contribute to the conversation. Of course funding is also on that wish list. Although Dr. Trainer did receive intermittent internal funding, he would have liked to receive a larger grant to support further game development.

Over all Dr. Trainer describes his experience with game based learning in a positive light. He plans to continue using games in his higher education classroom. Although the first time he implemented games into his online classroom, "it made [him] kind of crazy," he remains enthusiastic for the future of games in higher education because it was a "good kind of crazy. It was the first time any of his students had experiences the unique pedagogical approach and the "people in the department were kind of excited about it too." Refer to Appendix F, Tables F1-F3 for a synopsis of highlighted in vivo evidence for Dr. Trainer's narrative.

Participant 1b: Dr. Stevens Faculty Support Narrative

Dr. Stevens was a graduate student of Dr. Trainer and assisted in the game design. Dr. Stevens is currently an instructional design specialist and game-design scientist at a northeastern university. His background includes working as a genetic engineer and teaching at the high school level in the sciences. His interest DGBL stems from his desire to mix pedagogy with pop culture. He ultimately entered a doctoral program where he studied game based learning. His current position includes assisting faculty create innovative and engaging instructional materials for their classroom, however he clarified that he has not produced digital video games. He specializes in tabletop, and role-playing games, however he admits that it was video games that sparked his interest in the field. Dr. Stevens has a unique perspective because he has experience as both K-12 and higher education instructor, and is an instructional support specialist and game designer. He explained that experience allows him to understand "both sides of the coin." He voiced concern for those situated on one side or other due to the lack of "protective communicators" that impact dialogue from the instructional/pedagogical side to the game design side. He described his perspective as a "symbiotic relationship."

Support for game choice. According to Dr. Stevens, an important part of the game choice is the provision a safe space for the student to inquire and explore. An instructor should consider the right time and place for games and specific game mechanics prior to implementing them. Dr. Stevens believes that a game need not be something that's a fully digital world but it can be something as simple as a card game as long as it's getting the students to demonstrate a skill that you want them to have in the real world. Dr. Stevens provides the faculty with games that they can try, or articles to read. For example, the instructor may read about the difference between a simulation and a game and then decide which is the better personal fit. After multiple discussions and negotiations, "the end goal is to have something interactive and gainful." Dr. Stevens suggests that an instructor new to implementing games can lower the barriers to entry by using board games and card games, which are more straightforward. The instructions can be supplied as an easy to read manual as opposed to a more complicated tutorial, making uptake easier for both students and instructors. He suggested using games as a method to bench mark the student progress and that playing a game is great way to assess "general attitude and knowledge" over time. He explained, "It's not necessary to think as big as a video game in order to accomplish the instructional goal that you have."

An important strategy used by Dr. Stevens when assisting instructors new to game based learning is to first establish the instructor's frame of reference for games and build from there. He also makes sure the instructor understands what games can offer by having them remember games they played, irrespective of their background and the games being something as simple as "Go Fish" or a technologically advanced 3D video game. He asks them to reflect on why they played in the first place and why they continued to play. "What about it interests you?"

Pedagogy support. In addition to the importance of the instructor choosing the correct game for their classroom, Dr. Stevens relies heavily on pedagogic methods to ensure the games meet the educational goals. He emphasized the need for learning objectives stating that they are "not only a good thing, they are necessary." He noticed that when he steps out from the department of education, most of the faculty are subject matter experts, however, they have little training in pedagogy. Dr. Stevens always requests a list of learning objectives. Creating learning objectives gives the course direction so that the instructor doesn't "drive on the open road, hoping to get to a destination," instead of following a purposeful route. The instructor needs to have a clear vision of what they want the student to know, and what skills they want them to have.

Dr. Stevens and Dr. Trainer share an interesting vision on how games should be designed to best serve the students. They describe the vision as a "sandbox on rails approach" that gives students ample space to play and be creative (in the sandbox), while ensuring forward progress (on rails). Arrival at the end of the rail should result in meeting the learning objective. A rail to "nowhere" is a sure road to failure, he explains, and "you have to make sure you have a niche destination." Dr. Stevens voiced a strong need for "integrating the technology that [was] chosen with a pedagogy, depending what learning theory is kind of underpinning it, [and] all the content." Simply put, the game design must be based solid pedagogy and learning theory. The heavy reliance on pedagogy isn't surprising as he is a self-described ideological purist when it comes to education and how people learn.

Dr. Stevens is a strong believer in using the flipped classroom model and games are an effective tool in this format. He feels that faculty need to learn to let go of some of the control over the learning and trust the students to do work to prepare for class. Dr. Stevens would like to

see a movement from all text learning to online resources that provide video and interactive learning. He states that is has "been a very hard decoupling to come through with, to get people to understand that it's okay for them not to run the show and that students are smart and capable and will learn on their own."

Game design. During the game implementation, Dr. Stevens always keeps track of the things that work well and the "pitfalls" to direct the reiteration of the game, making the implementation process a lengthily one. It is expected the game reiteration process will continue over the course of several semesters. He employs the interactive systems design process known as ADDIE, blended with technology integration of the TPACK model described by Koehler and Mishra (2009). Together he and Dr. Trainer were "just hammering out changes to the program."

When instructors run into conflicts while using games, Dr. Stevens figures out if it is a theoretical or practical problem. If students are lagging behind he provides the faculty with strategies to bring the students up to speed. Additionally, faculty may be constrained by the institution's teaching requirements, for example testing formats. He assists faculty with meeting the guidelines as dictated by the university and accreditation agencies.

University support. Dr. Stevens described the university as progressive and forward thinking; however, there is still a lot of "old school thinking going on." This divides the university into two camps; one camp of progressives and one that is the contingent "old guard" who are less interested in *how* people teach. Adding to the division is what he described as "silos of knowledge" meaning that the academic departments are interested in what they are doing, but much less interested in what other departments are doing. This further divide makes it even more difficult to bring a sweeping change or innovation across the university. Dr. Stevens suggests finding key specific people that have a vested interest in forward thinking aggressive attitude

about higher education to negotiate on your behalf with the "old guard" to free up resources needed to bridge the departments and institute a university wide mentality. Adaptation of technology to change the way we teach has been slow in higher education and Dr. Stevens believes it is "way behind" K-12. "It has been a tough nut to crack," he said with all seriousness.

Finally, Dr. Stevens is happy to report that he has found a great deal of intra-university support. He finds the gaming community in higher education still relatively small, yet much larger than he initially anticipated. Additionally, he finds it to be a "close knit" community" that is agreeable to collaboration among peers at other universities. He states "It much easier for us to do the research and the work we do because we can find those people who are looking to do the same thing, kind of glob onto them, and say hey, join our community where we are trying to get the same goal that you are so." Appendix F, Table F4 provides in vivo evidence for the Dr. Stevens narrative.

Participant 2: Dr. LaDuke Faculty Instructor Narrative

Dr. LaDuke is an associate professor at a medical school on the west coast of the United States. Dr. LaDuke in an expert in his field demonstrated by his co-authoring forty scholarly works, thirty-nine publications is his medical field and one publication on his use of games in the higher education classroom. His teaching has been honored through the presentation of several awards by his university, including an award for excellence in teaching and for developing educational tools for medical students and residents. Dr. LaDuke has not had formal training in game design or computer programming. The games implemented by Dr. LaDuke are interactive digital games that were built using pre-existing commercial platform and personalized with the instructor content. The game is currently being used as a supplement the student learning.

Decision. Dr. LaDuke played digital games in his youth. However, when asked if he considered himself a "gamer" he replied that he was a long time ago, but "I'm not as much now though... it's fun but the newer games are very involved and I just don't have much time." His interest incorporation of educational games into his lecture was a result of a positive experience during his academic training. He explained, "In our residency we [played] games like Family Feud, Who Wants to be a Millionaire and Hollywood Squares. It made me [want] to use it in lectures." The games Dr. LaDuke uses in his classrooms are similar to those that were incorporated into his residency and follow the television game show format. Dr. LaDuke preferred an active learning style when he was a student. "Some of the things that I thought were more interesting when I was a trainee were those types of lectures where your getting involved and your kind of put on the spot a little bit" explained Dr. LaDuke, "I got a little more out of it, so I wanted to try to develop that." Dr. LaDuke's research interest in DGBL includes examining the efficiency of the games as a stand-alone learning tool. His interest in developing a stand-alone game came to him during his fellowship, and continued as a junior faculty member. He examined if games are something that he can "set up and then just have them just go against each other with the sort of competition being one motivator." Dr. LaDuke believes the students "liked that interaction, but [also liked] having the [instructor] right there to ask questions."

Dr. LaDuke's motivation behind his decision to continue to use games is that it "increases interactivity with our learners." It provides "a little bit of friendly competition [that] keeps them engaged." Keeping students engaged is a goal in both K-12 and higher education. Unfortunately, with phones and computers having made an appearance in classrooms, Dr. LaDuke found that "half the students are sitting there on their iPhone or they are not paying attention…this forces them to be involved and be engaged." In addition to engagement, he also

wants to teach his students to be team players, and he finds games "good for team learning", and "definitely" plans on continuing to use games in his course.

Dr. LaDuke spoke to the challenge of using games when his student residents are located at different sites. To meet this challenge and continue to use games, Dr. LaDuke has migrated "towards things like *Nearpod* where you can have web-based participation…but explained [distance education has] been a new wrinkle." With the help of the web-based games, Dr. LaDuke used the separate sites to fuel his team-based competition by pitting students at different locations against each other, something that he described as being "fun."

Time management. Dr. LaDuke's described his time at work as a rigid and set schedule dependent on his teaching obligations in a clinical series that allows one day per week for academic time. That day is spent on a multitude of tasks including writing manuscripts and developing teaching materials. His workload includes serving on several committees including the Resident Education Committee, Resident Selection Committee and the Resident Clinical Competency Committee. "There's a lot to juggle." Fortunately, Dr. LaDuke was awarded a small grant through his university that included time to develop the game. With his busy schedule, the funding was important because it provided time needed to "learn a little bit of coding." Dr. LaDuke explained with an inflexible schedule, "the grant bought me academic time to make it, so I had additional days of the week where I could do the coding to make that specific game." He valued the extra time that made it easier to learn the new skills while simultaneously juggling a busy work schedule with little flexibility.

A time saving strategy for game development that is used by Dr. LaDuke is using a good template that allows you to add your own content and personalize for your students. When he became acquainted with the commercial software, "it wasn't too much extra time to start

incorporating my own material into it." This is not unlike the template strategy that Dr. LaDuke uses to write lectures. On advice of a colleague, he creates lecture modules that can be mixed and matched and crossed over between courses. If something doesn't work quite the way he expected, he can simply switch that one section out.

Support. The support Dr. LaDuke received from his institution contributed to his successful development of DGBL. His institution supplied academic funds that permitted him to attend conferences on game based learning, attend courses and shops where he could learn coding, and game design skills. His long-standing interest and technological skill set has led to his being considered to be the "go-to" person by his department chair. He advocates for taking classes or participating in workshops and bringing that information back to your institution. Dr. LaDuke was also grateful to the assistance of the grant providers who also put him in touch with subject matter experts that provided feedback on the game. Additionally, Dr. LaDuke found valuable support in like-minded academic peers and through joining a network of people outside his institution who are "involved in putting together, using sort of innovative technologies." Unfortunately, Dr. LaDuke has limited colleagues at his institution that share his interest in DGBL.

Over all Dr. LaDuke describes his experience with game based learning in higher education as "very positive", "doable", "fun", but also advises that to be successful, you should find what is interesting to you and would work for your specific audience. Appendix F, Tables F5-F7 provides in vivo evidence for the Dr. LaDuke narrative.

Participant 3a: Dr. Brunkard Faculty Instructor Narrative

Dr. Brunkard is an assistant professor at a Canadian medical school. Dr. Brunkard in an expert lecturer in her field as evidenced by authoring and editing a published book and multiple

peer-reviewed papers. She obtained a Ph.D. in Leadership Studies and her professional interests include game-based learning, simulations, learning theory and evidence based practice, innovation and education. Currently, she is mentoring several Masters and Ph.D. students that are involved in DGBL and has taught courses in innovation. The game Dr. Brunkard uses in her courses was developed in-house using a commercially available online platform. The platform design is based on an instructional design theory known as quest-based learning and the game mechanics provides a flexible learning curriculum (Haskell, 2013). Dr. Brunkard has also done collaborative work with a goal to "gamify" simulations. "The funny part is," she said with a smile, "that I am not a gamer!" She claimed to be a "voyeur of gaming" because she observes family members playing video games, and although she admits to an occasional game of Angry Birds, she would not call herself a gamer "by any stretch."

Decision. Dr. Brunkard may not consider herself a gamer, but she has studied educational pedagogy. What appealed to her about games was that it was a method to improve student learning. Improved student learning was also the "motivation and "driver" that got her to dive into game based learning literature and conduct research on games as educational motivators.

Dr. Brunkard found a need to foster student motivation in a new research course that she was to teach for the first time. She began teaching an online version of what is commonly referred to by the students as a "dry and boring subject." After hearing undergraduate students voicing their confusion at the connection between clinical work and research, Dr. Brunkard searched for a way to bridge the divide. As strong believer in evidence based practice, she wanted her students to make the connection between what they were learning in their courses and how to find the most recent evidence to support decision-making. She explained that mixing

a topic perceived as "dry and boring" with an online delivery platform was a "perfect recipe for them to completely check out." When considering how to redesign the course and make it engaging for the students, she bumped into a colleague at a faculty development workshop who was using "quest-based" DGBL. She was excited about the platform and immediately began her own research into the web based game platform 3D Game Lab. It wasn't long before she decided, "you know, I am going to try this." The minimal cost allowed her to begin the DGBL project without prior work and time required to obtain an external funding source. Her goal was to redesign the course from something that could be considered "a data dump" into an interactive and relevant learning experience.

Time management strategies. It always takes time to learn a new software package and Dr. Brunkard found this to be the case with the online gaming platform. Dr. Brunkard found the tutorials provided by the site were convenient and substantially lowered the learning curve. The commercial site provided a tutorial in a game format, however due to her other work commitments it took her two weeks to complete. With what she described as a "blank canvas" in front of her, she was prepared to just drop her existing syllabus into the game when she realized that it wouldn't work. It took some time for her to figure out how she wanted to structure the course, she explained with a chuckle, "I mulled on it and then about a week later, in the shower, I always have the best ideas in the shower, it came to me." The development required time, however, being a new recruit to the university, Dr. Brunkard was given some release time to develop her courses. "That's where I had the time to kind of do the development" she explained, "and I did that through the fall and then actually launched the course in January." During the time she was developing the game, she was also writing a proposal and completing the ethics paperwork to pilot test the new pedagogic game platform. Although, her strategy of setting up

the research component to test her game with student outcomes did add more time commitments up front, the result was obtaining external funding to further develop game based learning research projects. She explained her strategy as being similar the Scrabble game's double word scores, "So you see what I have done here, is that my teaching is my research."

The external grant funding also proved to be important for freeing up time and building an infrastructure. She clarified, "I am able to now pay a research coordinator so that I don't have to do so much of the things that somebody else can do. I can then preserve my time for doing the things that only I can do in terms of the thinking and the developing of the game elements and that sort of stuff." She believes that if you are curious and engaged in developing new techniques, they warrant evidence of their effectiveness. She explains that her time management strategies mirror those strategies used in constructing games, "It goes back to, you know, constructing the game appropriately. You have to construct your life in a way that that hangs together and doesn't expend energy in ways that don't make sense!"

Support. Dr. Brunkard received support from the online company to cultivate the skills that were a prerequisite to creating games using their tutorials. She was delighted that the company's instruction strategy was to play a game using the software. She smiled and said, "I mean brilliant, right? Of course it is very effective." By leveling up in the online tutorial, "you finally get to the point where it's like great, I know enough now," and feel comfortable to begin building a game. However, game development isn't just understanding software use. Fortunately, the online subscription included an ongoing online faculty support and a "help desk" support function that she found to be very "responsive." She examined additional DGBL information by known DGBL experts available in YouTube videos and gained insight into the mechanics of designing an effective game. Dr. Brunkard found that to be one of the most difficult aspects to

creating a game. She explained, "Thinking through it and conceptually structuring [the course material] in a way that made sense and that would actually work mechanically in the game," took the most time. Dr. Brunkard is adamant that proper use of the gaming software is critical to success. It cannot simply be plugging in content from your course with out first reworking that material. She explained DGBL can be used successfully or produce poor results, and warns about using technology just for the sake of using technology. She states, "It's about the time structuring, it's understanding the motivation and the secret sauce of games and designing it for what it is intended, and not just use it as a new bell and whistle."

As previously mentioned, Dr. Brunkard has received internal and external funding. Dr. Brunkard purchased her subscription to the online software using a professional development fund. The funding also provided Dr. Brunkard the means to support other faculty interested in DGBL and further develop DGBL at her institution. She has used the funding to conduct a number of workshops for faculty that are interested in implementing games at her university. It is important to "understand it correctly before you engage in it for your own sake and for your students' sake" she advised. When she first began, she "made it up as [she] went along." Since then, she has become the support for many of her peers who have expressed interest at her institution and at other institutions. The grant money has also helped to fund a special interest group that discusses the different approaches they are experimenting with. The sharing of ideas has resulted in intellectual growth with in her department. Although there are different models being used, Dr. Brunkard stresses that it important to be "clear on what you hope to accomplish," and "construct it in a way that is student centered and pedagogically sound." Although Dr. Brunkard has a background in pedagogy, the group provides the opportunity to consult with instructional design experts to ensure that "you got it right." It is particularly beneficial to faculty

who are not clear on how to include an underlying pedagogy in the construction of the game instruction to have access to instructional designers. Appendix F, Tables F8-F10 provide in vivo evidence for the Dr. Brunkard's narrative.

Participant 3b: Ms. Steel Faculty Support Narrative

Ms. Steel is currently the Director of Teaching and Learning at a Canadian university. She assisted Dr. Brunkard's implementation of a digital game that contained the content of the course in its entirety. Her primary role in her university position is to support the integration of technology in a pedagogically sound way. Ms. Steel grew up in the Nintendo era and although she did play these games as a teen, she does not consider herself to be a "gamer." However, she does feel very comfortable with the technology. Ms. Steel's interview offered a different perspective that encompassed the requirements that faculty should to consider when considering games and the support that can be offered by staff that can improve the chance of successful implementation.

Game choice support. Dr. Steel provided support for Dr. Brunkard's online game based course that required simultaneous use of a learning management system (LMS). There are certain commitments that the school has made to the online students, such as making available the course syllabus, instructions and grades through the LMS. In this case, the LMS contained support for the game dynamics, play rules, and how grades are assigned based on the completion of the game "quests." In addition to the game directives, an important support provided by Ms. Steel was the assurance that the game play met technology policies and privacy concerns of the university and by law. As an expert in educational policy, Ms. Steel was able to assure that Dr. Brunkard was meeting all criteria necessary and that the students worked within the required

policies. For example, there are institutional rules that govern how students can use their campus ID's externally.

The LMS was a good place to start and lay the ground rules of what they could do inside the commercial game lab and consider the student expectations for support. Together Dr. Brunkard and Ms. Steel made it work so the students had step-by-step instructions in the game lab given to them in their LMS. There was access to further resource information provided by the commercial game lab web site.

Pedagogy support. Ms. Steel gives a lot of credit to Dr. Brunkard for being an early adopter of new software says that she is always "happy to dive right in there, but not everyone lives in that land." Getting and responding to formative feedback from the students was one of Dr. Brunkard' major concerns, and Ms. Steel was able to provide the needed assistance. In one such instance, it was detected early on that the online students desired more contact with the instructor and thus mid way into course they implemented face-to-face time. Keeping with the game pedagogy, they built in a quest that hosted a guest speaker and attendance at the online seminar increased the points earned in the game. In a meeting where game based learning was discussed, the attendees agreed that they have all been using game mechanics much longer than originally thought. Although, Dr. Brunkard produced their first official DGBL course, they agreed that student choice of educational content and use of gaming elements has been practiced for many years.

One element of gaming is providing a competitive environment, however, Ms. Steel warned, "Competition really depends on audience." Her experience has been that in the incoming undergraduate student isn't as competitive as the ones who have previously earned a degree. Additionally, she found that graduate students appreciated the "leader board"

components. She enjoyed telling the story of one student feedback that proclaimed, "Congratulations you made me read my text book!" Another component of the quest-based game that Ms. Steel found to be well received by the students was the choice and self-directed learning provided by implementing a quest based game. The entire course was designed using quests, some of which were mandatory and some of which were voluntary. The voluntary quests gave the students a sense of self-directed learning and allowed them to explore related topics they found interesting. She was pleased to report that the students continued "questing" long after they received an A for the course.

Game design. The creation of the DGBL online course was modified to address student concerns collected through a formative feedback process. The feedback was manageable in Dr. Brunkard's online class size of approximately 20 students, however it would be considerably less so in larger class sizes, some of which can reach 70 students. The consideration of class size was an interesting concern and a common dilemma that be experienced by other faculty. Ms. Steel suggested, "holding back" and trying some of the elements of gaming in the larger classrooms may lead to greater success. One method she suggested that would allow a "dipping your toes in gaming" was to start by designing game quests to be used as a participation mark or grade. Some instructors will allow up to 20% of the course grade to be participation and designing game quests is one way to encourage participation. She explained that this "gives you a chance to see if the students like it and are learning before you commit to it." The instructor would be wise to see if the students value the gaming pedagogy. Her advice, "Take the baby steps. Don't try to do a whole course right out of the gate." The instructors have to be on top of it all the time and the feedback can be overwhelming.

University support. Ms. Steel was proud that the administration is fundamentally aware of the faculty need for teaching support. Instructors are encouraged to make course content more relative to the student learning experience. She explained, "Innovation is rewarded." To date, all the projects she has been involved with have been grass roots faculty led initiatives and Dr. Brunkard's use of DGBL was the first of its sort at the university. Faculty creativity and innovation are improved by the fact that there is a team of support specialists there to guide them and help with policy and good pedagogic practice. It allows the faculty to be "forward thinking" resulting in "better programs [for] the students and certainly more satisfied instructors." Appendix F, Table F11 provides in vivo evidence for Ms. Steel's narrative.

Participant 4: Dr. Pekala Faculty Instructor Narrative

Dr. Pekala was an assistant English professor at a Northeastern Community College in the United States during the time he was implementing games into higher education classrooms. He has expertise in English literature and received a distinguished dissertation of the year award. He has published many peer-reviewed articles in his academic discipline and in game based learning. Although an expert in game based learning, Dr. Pekala doesn't consider himself a "big gamer." He played Atari and Nintendo as a child, but currently he mostly enjoys tabletop board games. However, he has participated in the design three videogames for math education that can be played on an iPad or an iPhone and finds this to be an achievable goal for most faculty instructors. He believes that student's expectations of video games mirrors the 3D graphic animations with million dollar budgets, making it hard to compete. Dr. Pekala has also participated in the implementation of games using a lower technology, lower cost approach and describes this as having fewer barriers to entry. He explained that creating a video game is a much bigger commitment and investment, both monetarily and in time.

Decision. An English professor at a community college, Dr. Pekala helped students with improving their basic reading and writing skills. He didn't set out to be a game designer. Building a game based LMS with the help of a faculty peer and a contracted professional is what "sort of threw [him] into it." Once "thrown" into the world of software development, production cycles and team meetings he became submerged into educational gaming. One of the promises of DGBL is "that small groups of trainers, teachers, content experts and game designers working together can create experiences that will radically improve the learning" to Prensky (2001a, p. 17). This is exactly what Dr. Pekala and his team set out to do in what he describes as a "totally grassroots" approach. Their goal was to "really grab students" and improve the learning using a "very different" approach that is "good pedagogy."

Dr. Pekala was fortunate to have a group of peers interested in implementing games; hence the effort took a multi-discipline approach. Subject matter experts collaborated with computer information systems experts and developed a suit of games to assist students with remedial math. This case is unique to this study because Dr. Pekala is the only participant that was part of a team project that resulted in the decision of multiple instructors to implement games. In addition to using games in his own English courses, he was part of a much larger STEM education initiative. At the heart of the initiative was student leaning. Dr. Pekala stated, "a lot of what game-based learning offers is that ability to kind of really reach students, engage them and help them do some hands-on work."

Time management strategies. In regard to the time needed to develop games, Dr. Pekala reasons, "You have to come up with an assignment anyway, [you have to] write a lesson plan." He found that designing the lesson plan in a game based pedagogy didn't feel like he was spending more time, however, he felt like he was getting more out of his effort. To save time, he

uses proven game mechanics instead of "reinventing the wheel." Although he has designed semester long games and digital games, he admits that for most of his courses he will "just try to come up with neat, catchy, engaging assignments that incorporate some aspect of gaming, although they aren't "full-blown games."

Faculty new to implementing games for higher education must first learn about game mechanics and design. One tutorial that Dr. Pekala found effective and does not require a big investment in time is a card game designed to stimulate collaborations to brainstorm ideas for games. The card game, *What's Your Game Plan,* is available for sale online can help streamline the process of making non-digital games for use in the classroom and ensures all the components of game design are considered. He recommends starting low tech and designing games that do not require digital media before implementing digital games.

Support. Dr. Pekala and his colleagues received funding both internally and externally to create faculty development initiatives and to develop games in higher education. The work conducted under the internal grant led to a more significant award that included conducting outreach activities that helped spark the interest of other faculty. The faculty outreach resulted in several faculty instructors implementing DGBL at the community college. In addition to the monetary support, he also worked closely with the directors of learning at his institution.

Dr. Pekala's institution is part of a large network of campuses where Dr. Pekala and his colleagues developed the reputation of being the "games people." He strongly believes that faculty interested in implementing game based learning need a community of practice. He explains, "It is a lot easier to do when you have someone else providing feedback, and encouragement." He suggests using the communities of practice to brainstorm and play test the games. He explains that support is needed with any new pedagogy and for DGBL the first hurdle

is just getting through the bias that games can be serious. He doesn't believe that idea has penetrated higher education as thoroughly as it has K-12. Appendix F, Tables F12-F14 provide in vivo evidence for Dr. Pekala's narrative.

Participant 5: Dr. Murphy Faculty Instructor Narrative

Dr. Murphy is an associate professor at an Australian university with a specialty in Linguistics. Dr. Murphy has achieved recognition for excellence in teaching and has received awards for innovation, teaching and research. In addition to her doctorate, she holds a graduate certificate in education and has training in pedagogy. Her position at the university is language specialist. She helps hundreds of 'English as a second language' (ESL) students each semester. Although a self-described avid user of technology, she is not an enthusiastic up taker of new applications, unless there is a "clear and unique proposition that that software offers." She may have described herself as a "gamer" when she was younger, however she lost interest when the newer 3D games hit the market. She prefers the classic puzzle and logic type games, but admits to playing *Pokemon Go* on the advice of her students, mainly to keep informed of the trending popular games.

Decision. True to Dr. Murphy's belief that technology should only be used when necessary, she implemented DGBL in answer to an educational dilemma. She explained, "I had a problem, I had 500 kids and one of me." She also was looking for a way to engage students outside of the classroom and still provide a necessary auditory component. It was also important to her to replicate what she would do in a one-on-one session with the student. She stated, "What they clearly needed was a lot of practice and exposure and repetitive practice on a number of basic linguistic points, particularly vocabulary of listening skills and various sorts of things like that." Dr. Murphy foresaw the game as an efficient means to meet each criterion.

Dr. Murphy described many of the game attributes she incorporated that allowed her to deliver the lessons in a "fun" way. She was very enthusiastic in describing the game and stressed the need to make the game fun and at times even shocking. She spent time going through DGBL literature and was intrigued by the research that shown timing a response is a motivator. Thus, she incorporated timed play in the game. She also discovered that personalization of the game through using avatars and placing the player in circumstances that they would encounter in real world situations were very useful game characteristics that helped to meet the specified learning objectives. She based her games on her own experience and what she felt kept her engaged when playing a game, "the things that I know work for me," she rationalized. Additionally, she looked at successful game models that people were willing to spend money on. Although many of the games would not have met her needs, she was delighted that "it gave [her] enough to brainstorm on."

Time management strategies. Dr. Murphy performs all the duties of a senior lecturer, thus in addition to teaching face-to-face and online courses she holds committee appointments, advises students and conducts research. Her strategy to implement the game was to use academic time set aside for online teaching for the game development. Dr. Murphy is very coconscious of her time commitments and sets "very realistic time lines for things." She has been able to find a balance between her work, parenting and hobbies. Drawing well-established boundaries between work and her private life, she believes that time management should be conducted to suit your individual needs. One strategy that she employs is that she will not respond to e-mails on the weekend, "nonnegotiable".

Developing the game was a time consuming venture for Dr. Murphy. However, she found it enjoyable and considered it as a hobby as well. As such, she allowed it to cross into her off

work hours. Dr. Murphy "did the sort of creative lazing around work at home," discussing ideas with her family members and friends. She finds that to be the "more relaxed brainstorming time." Therefore, even though it was time consuming, "it's a hobby, so it's not a problem" she joked. However, she was serious in saying that the consistent seeking out of efficiencies can kill creativity and creative time isn't always time purposefully set aside. "You know you have lots of small moments where you just get an idea and inspirations just jump into your head."

Dr. Murphy considers herself to be very well organized. At work she block off time to accomplish specific tasks and believes that helps to make more efficient use of her time. When you give yourself a certain amount of time to do something, you become more focused on that effort. She also is realistic about how much one person can do and admits, "I say no to people." If she is asked to participate in a meeting and it conflicts with time that she has blocked for other tasks, she will decline. Firmly stating, "too bad, not negotiable."

She applies the same appreciation for her time to the time of her students. Hence, the game should serve a purpose and not waste people's time. One of the pros for game based learning is that although some may think it needs to be proper, she feels it needs to be fun. However, it must also "engage quickly and with focus." The game she designed could be effective in 15 minutes a day for two weeks. She describes a good game as something "quick and quite powerful." A good educational game designer will have an appreciation for what people need.

Support. Dr. Murphy describes her institution as being innovative and felt supported by the administration. She was part of an international innovative award that helped fund the first year of the DGBL project. She was also the recipient of an internal grant that also supplemented the project. Dr. Murphy was the sole content expert and designer of the game, however the

funding enabled her to out-source the coding of the game. Words of caution came as she described that working this way can be very expensive and she was less than satisfied working with the coders. In fact, she is currently learning coding so that she can continue to create games without relying on others and having the expense. Another word of caution came when talking about the platform on which you develop your game. She advises use of a "very well established and future proof script."

Dr. Murphy does not have a network of peers at her institution that are involved in DGBL, however she is currently involving the students in educational game designing. The student-developed games are more puzzles based and not similar to the action-script flash games that she has developed. Dr. Murphy advises not to make games, unless it's absolutely necessary, but admits she says that only because it is her stand on the use of all technology. Appendix F, Tables F15-F17 provide in vivo evidence for Dr. Murphy's narrative.

Participant 6: Dr. Lee Faculty Instructor Narrative

Dr. Lee is a tenured professor at a medical school in the southeastern United States and has been involved in teaching medical students for over twenty-five years. Dr. Lee has provided her expertise as a fellowship director and division chief within her specialty and has co-authored multiple peer reviewed journal articles in medicine and use of games in the higher education classroom. In addition to her teaching obligations she advises medial students and serves on multiple committees within her department and has been honored for this work. The educational game that Dr. Lee used in her course is an interactive 3-D video game that required a team of experts to create. Dr. Lee used seed money provided by her institution to hire a professional game development team and collaborated with the team as the subject matter expert. The game was designed to reinforce several important medical competencies. It is a multi-player game and

each player chooses a role to fulfill on the medical team. The game permitted data tracking of individual students or players that included questions response time, over all play time and level completion. It provided immediate feedback to the players following the completion of each level or mission. The game was well received at science meetings; however, due to funding issues game development has stopped. The game is not currently being used in the curriculum.

      Decision. Dr. Lee does not consider herself to be a "gamer" and describes her digital game capacities as being "terrible" and limited to bowling on the Wii, and "that's because it doesn't require specific controller just all I have to do is move." However, she very lightheartedly described her entire family as both "nerds" and "gamers." The idea for using DGBL for her medical teaching came from watching her family play online games that required team participation to win the game. "I was looking at him playing one day and I said, "Gosh, hey that's just like the [medical] team, except we have a doctor, and a pharmacist and a nurse and a social worker." This requirement of needing a whole team of people to "win" the game and the parallels with the team approach utilized by health professionals that provides comprehensive care, thus "keeping them alive" was the foundation of her thoughts to create a multi-player educational game. Subsequently, as she began looking more closely at the dynamics of the game structure and realized that the players needed to "memorize vast quantities of entirely useless information in order to win the game." Dr. Lee explains that killing one enemy each time requires the player to memorize a sequence of events that had to be performed perfectly each time, and "then it would stay with them forever!" She was sure that the same strategy could be used to help students memorize vast amount of useful knowledge. Additionally, she felt strongly that developing a game would be a successful pedagogy in higher education because "the vast

majority of people who succeed in graduate schools are visual learners because that's what you have to be good at in order to get that far."

Time management. As mentioned, Dr. Lee worked with a professional game development team to develop her game idea. While she was the subject matter expert, she was able to obtain funding to outsource the development of an advanced digital game that required a team of experts. For the first couple of years of the design process, she was permitted to aliquot 5% of her time. She describes the early days by saying, "the initial pieces of the game design and the data collection took at first an enormous amount of time." Therefore, "…much of it was done in the after-hours time." She impresses that the popularity and commonality of gaming and phone applications tends to obscure the magnitude of work that goes into putting digital games together. "Even something that sounds small is not small", said Dr. Lee while laughing, "it takes more than you think."

The game development team consisted of a subject matter expert (herself), professional game designers, programmers and artists. To develop a game of this magnitude she advocates for at least four technical people assigned to work solely on the one game project. Dr. Lee did not share any detailed strategies to manage her time, however stressed throughout the interview the tremendous amount of time and dedication that developing a video game requires. She spent many hours outside her normal work schedule to complete the first level of the game.

Support. Dr. Lee felt that her department was very supportive throughout the game development. She received $30K in seed money that remained from a science innovation grant. Monetary support was very important for creating a 3-D video that required expert game developers and coding skills. She explained, "We had enough money to do the first level of the game, and so when that was done then we had to go look for additional funding of some type."

Unfortunately, the quest for more funding was unanswered, although it wasn't for lack of trying. Dr. Lee tried the National Science Foundation, the National Institute for Health, the National Educational Association and several private institutions. She also tried going the commercialization route an applied for two Small Business Innovation Research grants. The efforts were unsuccessful. Unable to find a continued source of funding to support the game, there was no further development; she explains, "without funding you cannot pay people to actually do the game development."

Funding by her department paid for travel to two international meetings where the game was presented and well received. Hence, Dr. Lee, along with many of her colleagues was surprised at the difficulty in securing funding. She believes that part of the problem may lies with the lack of understanding of DGBL by the reviewers. She surmised "They're not gamers." There was also the difficulty of trying to "fit in" to a grant category. Feedback on the grant submissions included things like 'This is a great idea, but we are science people and it should be done by healthcare people.' The health care reviewers would respond similarly and say, 'This is a great idea but it should be done by education people.' Although reviewers seemed to appreciate the game, they felt that it wasn't a good fit for their funding descriptions and thus funding was denied.

In addition to monetary support, Dr. Lee is adamant that peer support is important. She maintains a network of peers with similar game based learning interests, and with whom she still gets together with on a fairly regular basis. She laughs as she says that they "pick each other's brains and talk to each other to be supportive" and "keep up on what's going on in the world."

She would love to finish the game one-day. However, her department chair can no longer support the project. When designing such a high end game, financial considerations are

profound. In addition to developing the game, there is also a need for ongoing support to maintain the website, create passwords that are blinded for students, provide technical support to the players as well as upgrading versions to run on newer computers and operating systems. The creation of a 3D video game is not something that can be done by yourself, she warns, "Don't even think about it!" Although she isn't currently using games in her classroom, she is still a strong believer in the learning potential for DGBL in higher education. She hopes to finish the game one-day, perhaps when the gaming generation becomes the grant reviewers she joked. Appendix F, Tables F18-F20 provide in vivo evidence for Dr. Lee's narrative.

Results and Interpretation

Emerging Themes

The purpose of the research was to examine the experiences of higher education faculty that are early adopters of DGBL in higher education programs. The conceptual framework was based in three research streams that included creativity and innovation, trending innovations in higher education, and digital game based learning. The researchers approach to the data analysis was a three-armed approach as show in Figure 5. The theories and prior research offered potential categories, however, the approach was flexible and "open to the unexpected allowing the analytic direction of the study to emerge" (Bloomberg & Volpe, 2016, p. 192).
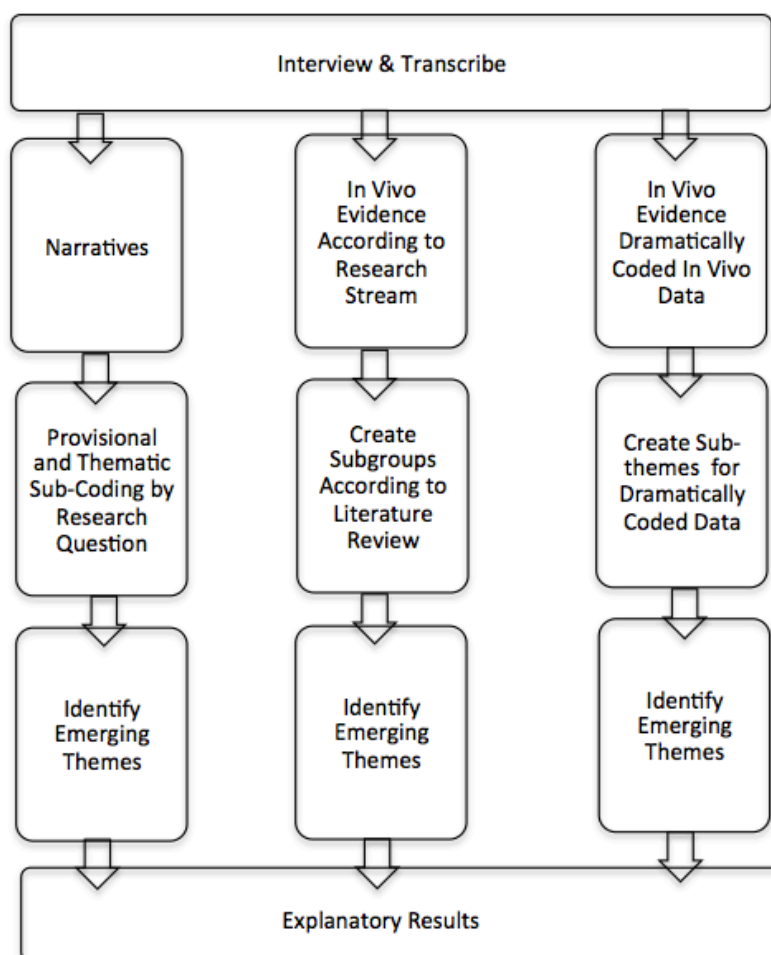
Figure 5. Three arm data analysis.

The first arm of the analysis approach is represented in the first column of Figure 5. The data analysis began by reviewing the interview transcriptions several times prior to writing individual narratives. Each transcript was coded into three provisional codes in accordance with the three key questions and in congruence with the interview protocol using NVIVO qualitative software package. This approach is described as being the template approach (Bloomberg & Volpe, 2016). These provisional codes were subsequently sub-coded into specific themes that emerged from the data and presented as evidence for the narrative. In vivo narrative evidence

comprised of the extracted words of the participant was recorded in table format and presented in

Appendix F. According to Creswell (2015, p. 246), "Describing and developing themes from the

data consists of answering the major research questions and forming an in-depth understanding

of the central phenomenon through description and thematic development."

Table 5. Narrative and key question coding scheme.

Faculty Narrative	Provisional Theme	Sub-theme
Q1	Decision	Personal experiences Student influence Game choice
Q2	Time Management Strategies	Developing the game Student interactions Course structure
Q3	Support	Peer support Faculty support Institutional support Monetary support
Support Narrative	**Provisional Theme**	**Sub-theme**
Q3	Support	Faculty support Pedagogy Game design Institutional support

The resulting provisional and thematic sub-codes for the faculty participants (Table 5) were as

follows: Q1-Decision (a) personal experiences (b) student influence and (c) game choice; Q2-

Time Management Strategies (a) developing the game (b) student interactions (c) course

structure; Q3-Support (a) peer support, (b) institutional support, and (c) monetary support. The

resulting provisional and thematic sub-codes for the faculty support participants are as follows:

Support (a) faculty support, (b) pedagogy, (c) game design, and (d) institutional support. The

thematic coding scheme and in vivo evidence for each participant are provided in Appendix F.

Following the narrative draft of each participant interview, the video recorded interviews were

re-watched and the narratives re-read until the researcher was convinced the data was comprehensive and accurately portrayed the participant.

The second arm of the data analysis approach coded the raw transcribed data to align with the conceptual framework and literature review. The researcher coded the transcribed data using NVIVO software. Pre-determined themes and subthemes were generated from the literature review and are detailed in Table 6. Each provisional theme and sub-theme was defined according to the corresponding discussion in the literature review. The workflow of the second arm of the data analysis is presented in the second column of Figure 5

Table 6. Conceptual framework and literature review coding scheme.

Conceptual Framework	Provisional Theme	Sub-theme
Creativity and Innovation	Creative Traits	Curiosity New Perspectives Problem Solver Self-perception Attitude Inventory Time Management Intrinsic Motivation
	Creative Environments	Freedom/Autonomy Resources-support networks Resources-monetary
Trending Innovations in HE	Learning platforms	Online Learning Blended Learning Simulation DGBL Flipped Classrooms Learning Management Systems
Game Based Learning	Pedagogy	Attitude Toward Games Behaviorism Cognitivism Humanism Constructivism Adult Learning Theory
	Curriculum Integration	Conflicts Emotion

The third arm of the research was completed using dramaturgical coding as described by Saldaña (2011). Each participants transcript was provisionally coded for objectives (OBJ) or the wants, needs, or motives of the faculty; the conflicts (CON) or obstacles the faculty face as they try to achieve their objectives; tactics (TAC) or tactics they engage to reach their goals; their attitudes (ATT) toward others or a given circumstance; and the emotions (EMO) they express throughout the implementation and game usage (Saldaña, 2011, p. 106). Each provisional code was pre-determined, and subsequently sub-coded as themes emerged, (Table 7). The resulting data was examined for emerging themes and is presented in the subsequent explanation of common themes section along with the corresponding in vivo evidence of the study participants. This analysis sequence is diagramed in the third column of Figure 5.

Table 7. Dramaturgical coding scheme

Provisional Code	Sub-theme
OBJ: Wants, Needs, Motives	Student Motivation Faculty Motivation Goals
CON: Obstacles faced by faculty	Multiple Site Funding Time Training Peers Administration
EMO: Personal Feelings	Positive Negative
IMP: Impacts, effects or consequences	Immediate Feedback Productiveness
TAC: Strategies & philosophies	Networking Learning Time Management Game Design
ATT: Attitudes	Personal insight and attitudes

Explanation of Common Themes

Narrative Analysis

The first arm of the analysis summarizes the participant's interview in a descriptive narrative. Table 8 shows the three pre-determined common themes based on the interview protocol and the subsequent thematic sub-codes that emerged during the participant interviews.

Table 8. Faculty narrative responses to three key questions.

Common Theme Key Questions	Emerging Sub-themes				
Decision	Student Motivation		Memorize Material	Student Teamwork	Personalize Learning
Time Management	Grant Funded Time	Admin. Granted Time	Combine Teaching & Research	Student Communication	Adhere to Schedule
Support	Conference Attendance		Internal grant Funding	Peer support and Collaborations	Instructional Design

Decision. The first part of the interview sought to uncover the basis for the faculty's decision to implement DGBL. The first pre-determined common theme resulted in the emergence of four sub-themes. Each of the four emerging sub-themes involved was relevant to student learning. The results are shown in Figure 6.
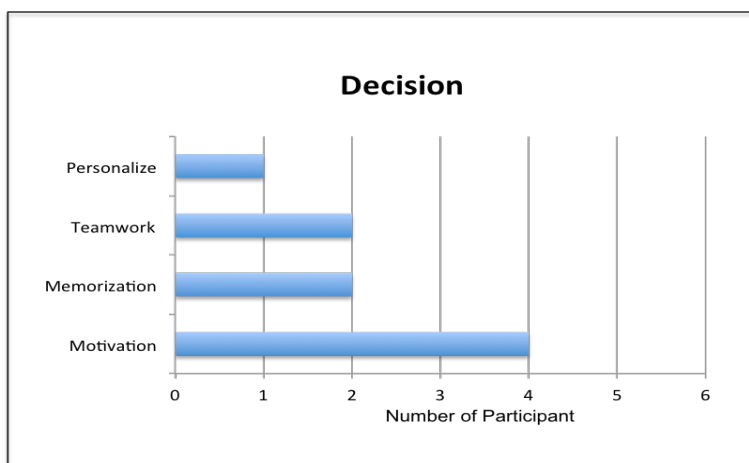
Figure 6. Decision to implement DGBL based in student need.

Four instructors cited the need for student motivation. Research backs the instructor choice of

games to inspire motivation (Oblinger, 2004; Prensky, 2001a; Proulx, Romero, & Arnab, 2017;

Woo, 2014). Two instructors discussed the need for students memorize vast amounts of

information and their decision to implement games as a method to help students obtain this goal.

Two instructors discussed using games as an approach to teach team cooperation. One faculty

expressed a need to reach large numbers of students with a personalized learning strategy for

learning language skills. Research has shown that DGBL is effective strategy for each

instructional need (Bolliger, Mills, White, & Kohyama, 2015; Chiu, Kao, & Reynolds, 2012;

Dourda, Bratitsis, Griva, & Papadopoulou, 2012; Franciosi, 2017).

Time management. The second part of the interview sought to uncover the faculty's

strategies to manage their time while implementing DGBL.
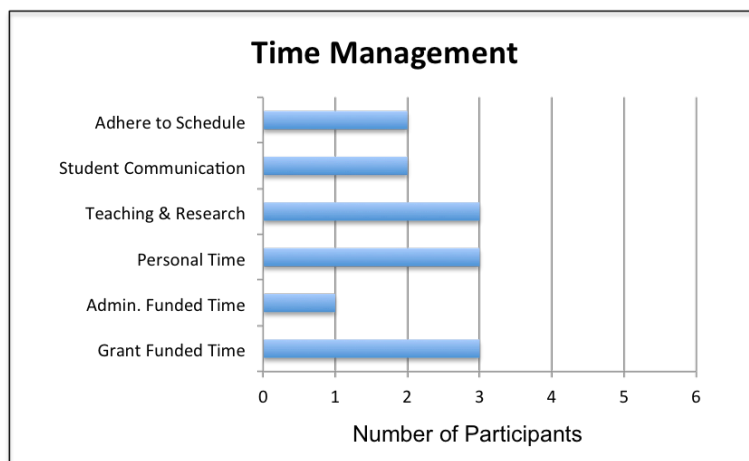
Figure 7. Time management strategies used by faculty.

As shown in Figure 7, three instructors were granted additional time allocation through grant

funding, and one instructor was granted time by the administration as a new faculty member.

Three instructors discussed the use of personal time to learn more about gaming by watching

others play games, playing games or doing actual work on the game development. Three

instructors discussed multi-tasking by combining the game development with research or

replacing their time to develop lectures with game. Two instructors found blocking off time to

respond to student e-mail communications a helpful strategy. Two instructors revealed they

construct and adhere to a strict time schedule. The importance of faculty managing their time is

emphasized by the survey results of Bentley and Kyvik (2012) which reveal faculty in English

speaking countries work an average of fifty hours per week. Additionally, there exists a plethora

of literature that denotes the necessity of time to foster creativity (Darini et al., 2011; McCharen

et al., 2011; M.A. Runco, 2004; Zampetakis, Bouranta, & Moustakis, 2010).

Support. The third part of the interview sought to reveal the support that faculty

received and the support that they felt was needed to be successful.
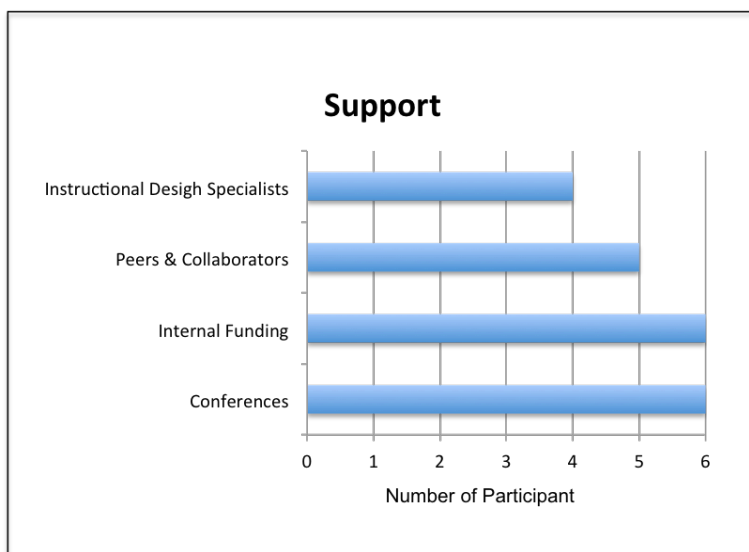
Figure 8. Support received by faculty.

As shown in Figure 8, all the faculty participants explained that attending conferences provided insight and contributed to their successful implementation of DGBL. Conferences present excellent networking opportunities, learning opportunities and instant feedback for current projects. All faculty participants received internal funding from their institution that was used to purchase software packages, professional services, or to attend conferences. Five faculty instructors discussed the importance of support from peers and "like-minded" individuals or the benefit of forming communities of practice, both of which promote exchange of ideas and experiences. All faculty instructors communicated their certainty for the importance of sound instructional design in a successful game. Professional support specialists assisted four faculty; two faculty that did not collaborate with specialists found support through online resources and tutorials.

Conceptual Framework Analyses

The following sections present the resulting common themes found among the faculty participants in the second arm of the analysis based in the conceptual framework, followed by a

brief description of the theme and in vivo evidence from select participants representative of the theme. A theme was considered common if it was evidenced among three or more faculty participants. The quotes presented are not a comprehensive inventory of the data collected but are representative and includes at least one or more statements made by each participant determined to exhibit that trait.

Creative traits. For the purpose of this study, creative traits are defined as personal characteristics or abilities that contribute to a person's creativity. Creativity is defined as the production of novel and useful ideas (Amabile, 1996) on an individual level (Oldham & Cummings, 1996). Novelty requires that the creative product did not exist in "precisely the same form" (Mark A. Runco & Jaeger, 2012). The creative traits that emerged as common themes were curiosity, new perspectives, problem solving, and time management. Refer to Table 9 for the definition of the common themes. Figure 9 indicates the number of study faculty participants that made statements indicating they possess a specific personal creativity trait.

Table 9. Definitions of common themes for creativity.

Common theme Creativity	Definition of theme
Curiosity	Desire to investigate and learn.
New Perspectives	Openness to new perspectives and making new connections between ideas.
Problem Solver	Ability to seek out and implement solutions to previously unmet needs or challenges.
Attitude Inventory	Expression of an attitude towards an interest or creative activity.
Time Management	Purposeful manipulation of scheduling tasks and events.
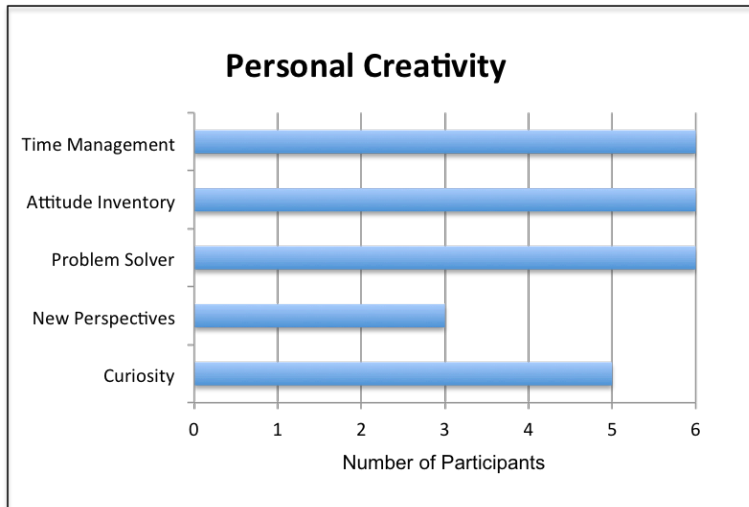
Figure 9. Common traits exhibited by faculty.

Curiosity. When an individual is curious they are "marked by a desire to investigate and learn" (Merriam-Webster, 2017) and is marked by "exploratory behavior" (Loewenstein, 1994). Five of the six faculty participants in this study made comments that revel a curious nature and their desire to investigate or learn. Participants expressed an intrinsically motivated desire to learn more about game based learning, how well games worked, and the impact of games on their student. Two participants demonstrated curiosity by watching their family members play video games in an effort to understand the key elements of gaming that elicited engagement, motivation and the continued desire to play. Five of the six participants expressed curiosity by their desire to continue learning about game based learning through networking and meeting attendance. Examples of the in vivo evidence drawn from the five participants include:

- I went back right away and started investigating.
- This was just another opportunity to explore another right answer.
- I thought that would be interesting.
- I was just curious to see how that would work.
- Like that to keep up on what's going on in the world.
- I still try to sort of keep up on what other people are doing.
- I've always been into kind of doing something innovative with my teaching particularly around gaming.

- Wanted to not only see if the games work but also how they work and whether they work in different disciplines.
- I like to and have watched my kids play and my husband play.
- I like teaching and learning.
- I could keep in contact with people around me, the culture around me.

New perspectives. A perspective is defined as how the interrelation between subjects or its parts is viewed. It may also refer to a point of view. One trait common to creativity is having openness to new perspectives or points of view. As stated in (Dahlen, 2010), "Just knowing the most is not enough. You must also be able to use your knowledge in new ways" (p. 7). Additionally, creative results can also be achieved by thinking "inside the box" rather than out, which increases the "likelihood of achieving creative results and also strengthens the impact and value of the creativity" (Dahlen, 2010, p. 11). This can be achieved in DGBL by incorporating new content into a game environment, combining games and simulation, or having new perspectives on games and learning. This study found three participants made statements during their interview that showed they had accepted or that they were willing to accept a different point of view, or verbalized a willingness to be open to new perspectives. Examples of the in vivo evidence drawn from the three participants include:

- We use that knowledge and that research from the game design world for educational purposes.
- Wouldn't it be great if we super impose game based principles into simulation to see if it enhances the student experience?
- I sort of realize how much of what we do already is a game.
- Broaden our understanding of what kind of learning could go into games.

Problem solver. Creative problems solving is the application of a novel solution to an unresolved issue. These studies results shown that all six participants were avid problem solvers. Faculty discussed solving problems or conflicts that are defined as insight problems (Gilhooly, 2016) and require a restructuring of a task to reach a solution. Insight problems discussed by the faculty were a lack of motivation by the students and the need to reach a large number of

students with a more personalized instructional method. Also discussed was the need to learn

new skills to overcome issues related to the incorporation of DGBL. Examples of the in vivo

evidence drawn from the six faculty participants include:

- Yeah, I can make this [game] work.
- I made it up as I was going along.
- I'm always looking for a solution.
- If you want better outcomes than what you currently have, you probably have to do something different.
- I knew that something had to change.
- I kind of was able to incorporate backward design principles.
- I took it upon myself to completely redesign the course.
- I sat down thinking about ways I could trick my students into doing the stuff I needed them to do.

Attitude inventory. The assumption is that a "creative person will express attitudes and

interests favoring creative activities" (Hocevar, 1981). This study revealed that all six-faculty

participants made statements throughout the interview that the researcher deemed as embracing a

positive attitude toward creative activities including developing games. The participants

overwhelming positive response to incorporating games included being excited, very interesting

captivated, fun, and the actual use of a game for learning as being a shiny new toy, cool,

valuable, brilliant, productive and generative. Finally, the intention to make more games or the

continued use of games indicates a positive attitude inventory. Examples of the in vivo evidence

have been drawn from six faculty participants and include:

- I was very excited
- It's really been very, very interesting
- Was instantly captivated.
- I think it's fun.
- I had this bright, shiny toy in front of me.
- Some of these turn into really cool games.
- Understand the value.
- I mean brilliant, right?
- Really productive, very generative.
- I would love to [make more games]

- I'm always going to use gaming.

Time management. Time management is in essence a planning process (Claessens,

Eerde, Rutte, & Roe, 2004). All participants cited busy work schedules that included by was not

limited to teaching and content development, research, committee meetings, student mentoring

and writing. Additionally, all participants discussed components of their time planning strategies.

Three faculty discussed time management in regard to their course structure that included the

increased flexibility of online lectures, and combining their instructional obligations with

research that enabled what Dr. Brunkard calls "a double whammy. Examples of the *in vivo*

evidence drawn from the three faculty instructors include:

- Make your talks and all your information into modules. [Provides a mixing and matching between courses rather than creating an entirely new lecture or if one section need updating]
- It hasn't reduced them but it's made my time commitments fit better.
- Combine your research and your teaching together and not separate.

Two instructors discussed managing student e-mail communications. Examples of the *in vivo*

evidence from both faculty instructors include:

- Between 6 and 11, I work through all of the emails.
- I don't answer e-mails on a weekend.
- I don't have my work e-mail on my phone.

Notably, all six instructors made general statements that expressed a need to effectively manage

time. Examples drawn from the *in vivo* evidence of the six participants include:

- I construct a kind of, artificial rhythm.
- There's a lot of juggle.
- Construct your life in a way that hangs together and doesn't expend energy in ways that don't make sense.
- It's imperative that time management is done in a way that serves your needs rather than you're constantly seeking out efficiencies.
- No sense in like reinventing the wheel.
- It's made my time commitments fit better.
- I was trying to find a balance.
- If it was during the day, I shifted something else to an evening.

- I don't negotiate a lot of stuff do with my time.
- I do stuff outside of working hours I claim back the time.

Creative environments. For the purpose of this study, creative environments defined as working conditions that promote creativity. Refer to Table 12 for the definition of the creative environment common themes associated with this research. Figure 10 shows the number of participants that made statements that indicate their work environment contained a specific trait.

Table 10. Definition of common themes for creative environments.

| Common Theme Creative Environment	Definition of theme
Freedom	Work with little oversight or direction to define and solve problems.
Resources - support	Collaborations and networking with peers and universities with common with the intent to improve practice.
Resources - monetary	Acquisition of internal or external funding that is directly related to studying or implementing game based learning.
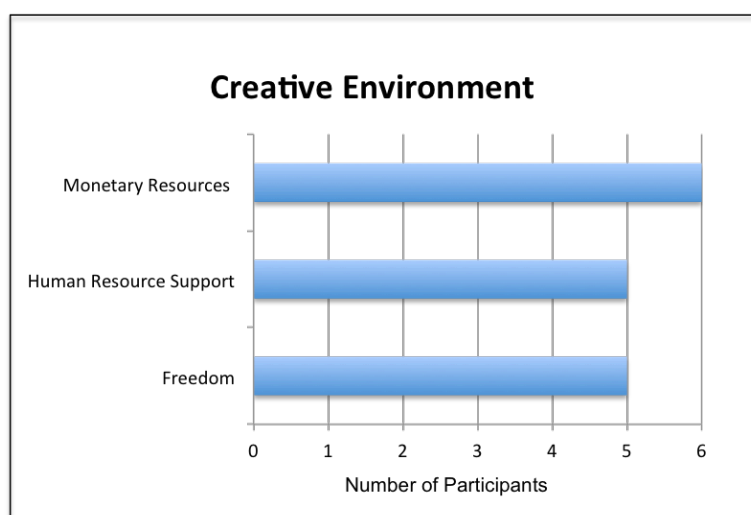
Figure 10. Faculty creative environment.

Freedom to define and resolve conflicts. Studies have shown that freedom in the work environment is important to promoting creativity (Amabile & Sensabaugh, 1992). For the purpose of this study, freedom is defined as the instructor's ability to work with little oversight or direction by their supervisors. This is exemplified by the permissiveness of the institution to grant instructor autonomy to define problems and generate solutions. This study revealed that five participants made statements that they had freedom to implement game based learning as solution to increase student interest and motivation, redesign courses or to personalize instruction in large classes.

Examples, drawn from the in vivo evidence of the five participants include:

- I had a problem. I had 500 students and one of me.
- But it's been a new wrinkle has to do with multiple different sites.
- It's tricky I think to implement gaming online
- So it sort of meets a number of needs.
- I was using a different instructional technique.
- I think I am going to do all of my courses online, and nobody said no.
- I took it upon myself to completely redesign the course.
- I said, you know, I'm going to try this.
- Part of that answer was gaming.
- I am going to use a different platform, and they are like, "Yeah. Yeah. Sure."

Two of the five instructors redesigned courses into an entirely game based learning platform as a solution to two distinct problems, one student based and one course based. The first faculty defined a problem with student motivation by describing the lecture hall becoming more and more scarcely populated as the semester progressed. The second faculty defined the problem as the course being very "boring and dry subject."

Human Resources: Five participants discussed collaborative support of peers and networking within their institutional environment. Examples were drawn from the five faculty participants in vivo evidence include:

- Find like-minded people to be your support.

- I have been able to get research assistance to help with some things.
- We had all these people who were collaborative and interested.
- You cannot do this by yourself."
- One thing that helped me more than anything else was accessed to instructional designers.
- The validation that I wasn't crazy and this was good instructional design.
- Getting intact into a network of people who are also involved.
- More instructional design expertise than you do.

Three of the five participants also discussed administrative interest and support. Examples of the in vivo evidence drawn from the three faculty participants that discussed administrative support include:

- The administration was interested in gaming.
- Administrators who've taken an interest in what we're doing have opened doors.
- My department chair is very supportive of this.
- I really did need to have the support of my department chair.

Monetary Resources. Institutions of higher learning often provide internal funding for a wide variety of undertakings including research, faculty development and travel. This study results revealed that all the participants were recipients of internal funding directly related to implementing games into the curriculum. Two participants obtained funding through external sources. Data was not collected as to the dollar amount of the individual grants.

Dramaturgical Coding Analysis

The following sections present the resulting common themes found among the faculty participants in the third arm of the analysis that dramaturgically coded (Saldaña, 2011) the raw data, followed by a brief description of the theme and in vivo evidence from select participants representative of the theme. A theme was considered common if it was evidenced among three or more faculty participants.

Objectives. For the purpose of this study, objectives is described by (Saldaña, 2011) as "wants, need, and motives" (p. 106) of the faculty. The motives discussed for the implementation

of game based learning was to improve student motivation and create an engaging learning

environment. Additionally, other objectives noted were to teach collaboration skills, and a belief

by the instructor that DGBL is a useful pedagogy. In vivo evidence of the faculty objectives is:

- My main motive was engagement.
- The reason why I do it is because that increases interactivity.
- I like to keep them interactive, keep them involved.
- By nature accustomed to thinking in teams.
- The end goal is to have something interactive and gainful.
- I think that they really grab students.
- It's good pedagogy.
- If they didn't work together, they would fail.

Conflicts. For the purpose of this study, conflicts is described by (Saldaña, 2011) as

"obstacles they face as they try to achieve their objectives" (p. 106). All six participants

discussed obstacles that may impede successful implementation. These included the costs

associated with the higher end 3D video games, the design challenges of the game, student

expectation of the game due to the high end commercial market standards, and the lack of

training in pedagogy and learning theory among higher education faculty. Examples of the in

vivo evidence of the participants concern for conflict include:

- I had this conundrum because then I had to start thinking about how I was going to structure this.
- It's hard to compete with a triple A game.
- This is not going to be a silver bullet that works for every student.
- It can be challenging.
- They have the interests but not necessarily have the skills to implement it.
- Teachers by trade will have a really hard time adopting this.
- A lot of higher education faculty whenever properly trained in teaching pedagogies.
- I'm not an educational psychologist.
- That's really costly.

Attitude. For the purpose of this study, attitudes is described by (Saldaña, 2011) as

experienced "toward others and their given circumstances" (p. 106). For the purpose of this study

circumstances was defined as the designing, developing and implementing DGBL. Examples of

the in vivo evidence of the participant's attitude include:

- A whole semester of training, which was fun.
- The most enjoyable part just working with colleagues.
- The videogame has to supplement good teaching and can't replace the teacher in the classrooms.
- Higher Ed has been a tough nut to crack for everybody.
- Things have changed so much in even the last decade.
- One of the things that come up often is unwillingness to trust the students to do that kind of work.
- Winning the game and mastering the skill have to be at least isomorphic in some fundamental way.
- I'm not an enthusiastic app taker unless I can I can see it as a very clear and unique proposition.
- I don't see technology as a solution in itself.

Summary

The incorporation of a new learning technology can be a daunting task for an already

overextended faculty. Early adopters of DGBL have found ways to circumvent the conflicts

associated with implementation. This research interviewed faculty employed by institutions on

three continents, from four different countries. The faculty instructors taught in a variety of

disciplines, and at a range of higher education academic levels. What they have in common is

they have all made the decision to implement DGBL into their higher education curriculum. This

research sought to discover commonalities behind the decision to implement DGBL, how the

faculty managed their time during the development and implementation, and what support they

received.

The faculty participants in the study shared four creative traits that may contribute to their

decision to implement DGBL. They are: curiosity, new perspectives, problem solving and time

management. The results indicate that the faculty valued student learning and sought to find a

solution for a lack of student motivation, and the lack of personal attention in large classrooms

and online. The faculty emerged as curious self-directed learners that were open to new perspectives and possessed problem-solving skills. In addition, they managed their time in a way that allowed their creativity to emerge. It is widely accepted that without creativity, there can be no innovation and that creativity requires time.

The results of this study reveled that some faculty had very flexible schedules while others had less leeway. Time management strategies shared among the faculty included: acquiring grant funding to permit additional time to develop games, combining teaching and research interests, managing student communications, and constructing and adhering to a self-imposed agenda and timetable. All faculty instructors shared the usual workload of higher education faculty that includes teaching, committee service, student mentoring and research. However, they all had a strategy that allowed them to set aside time to work on constructing the game. Several faculty instructors mentioned responding to student e-mails as a task that required a specific strategy.

All study participants reveled that all faculty found attendance at game based learning conferences was an important support for their personal learning and motivation to implement games. In addition, the support of the faculty's institution through internal grant funding that provided money for software or bought faculty time was important. The results show that the faculty find support in the collaboration with like-minded peers and participate in communities of practice.

Finally, this research revealed a common objective to increase student engagement, and openness that learning can and should be fun. There are obstacles to implementing any new learning pedagogy or technology, including costs and bias. However, the pursuit new and

innovative technologies to meet these challenges can be exciting for the instructor and result in

effective learning for the student.

Chapter 5: Conclusions and Recommendations

This chapter is organized into four main sections: Introduction, Conclusions, Recommendations, and Summary. The Introduction is an executive summary of chapters 1 through 4. The Conclusions section provides a detailed response to the research questions proposed in this study. The Recommendations section provides solutions to the research problem identified. Also within the recommendations section, the researcher discusses the implications of this study for the higher education faculty instructors that would like to implement digital game based learning strategies. The Summary provides the concluding statement.

Introduction

A plethora of research exists that examines the "digital native" student's need for education that more closely parallels the digital economy and student's daily life activities. Educators are clambering to find ways to engage and motivate students while preparing them for the technology entrenched 21st century workforce. Today's students expect educational technology to be a source of engagement, and a means to provide relevancy and convenience (Istance & Kools, 2013). Research has shown that DGBL is a successful tool to address engagement and motivation concerns and to reach learning objectives in higher education (Ariffin & Sulaiman, 2013; Moylan et al., 2015; Nadolny & Halabi, 2015). DGBL has become a popular approach in K-12 educational practice to address some of these expectations; however, higher education has been slower to acceptance and implementation.

Creative actions are preceded by a decision to be creative (Sternberg, 2002, 2006), and research has shown traits associated with creative people, including curiosity, openness to new perspectives, problem solving, positive attitudes, and time to be creative (Amabile & Sensabaugh, 1992; Dundon, 2002; Kayaalp, 2014; Kirton, 2011). Implementing a new

technology can employ a "top down" or "bottom up" innovative strategy, however both require time management skills and support (Crowther et al., 2001; Darini et al., 2011; Kayaalp, 2014; Lorfink, 2012). Together, these findings guided the key questions associated with this research. The key questions are as follows:

1. What was the basis of the faculty decision to implement DGBL?

2. How do instructors balance the effort required to implement DGBL with their workload and academic responsibilities?

3. How did additional support (or lack of) influence the faculty experience when implementing DGBL?

The conceptual framework that informed this study explored three themes, creativity and innovation, trending innovations in higher education, and digital game based learning. Creativity and innovation is critical to bring about change in educational practices. New trends and innovations require educators remain current in their knowledge and training, adding to the already substantial faculty workload. DGBL is finding its way into college curricula. A plethora of studies have explored the pedagogy and learning theories behind its use, however acceptance and integration has been slow to occur in higher education.

This research employed a multi-case study approach and employed a semi-structured interview as the primary means of data collection, allowing for a focused exploration of the key questions while still permitting the illumination of a detailed understanding of the personal and unique experiences. Using triangulation of multiple data points, this study was guided by the maximum variation strategy. The participants in this study included six faculty instructors and two support staff that are employed in higher education. To support the maximization of the variation in the date, the participants were chosen deliberately from a range of institutions from

four different countries and included a two-year undergraduate school, and undergraduate, graduate and medical school instructors.

The findings of this study showed that the faculty's self-perception of being a "gamer" is not a contributing characteristic behind the participant's decision to implement games in the classroom. The findings of this study also showed that the faculty decided to use game based learning as a solution in response to conflicts or problems they identified in their classroom and that the decision was a "bottom-up" faculty led initiative directed toward increasing student motivation and engagement, promote collaboration and team learning, and personalize instruction. The early adopters of DGBL in this study had several creative characteristics in common that may contribute to their decision to explore and ultimately implement the innovative pedagogy.

The faculty workload and job expectations were similar across all participants and would be considered typical for higher education faculty. Overall the faculty described a creative work environment that provided flexibility, with only one participant defining their schedule as rigid. Also contributing to the creative work environment was the autonomy to manage their time and implement strategies that satisfied their unique cases. The faculty, focused on improving student learning, found that blocking off time for student interaction was beneficial. Finally, a positive attitude inventory of the faculty toward DGBL was evidenced.

The challenges faced by the faculty that benefited from support included the lack of pedagogic training and game design challenges. Creative work environments provide needed resources to employees. The faculty instructors had varying degrees of monetary support, however all received internal grants that were beneficial to faculty development and game implementation. Cost was described as being an issue only in the high-end 3D video game. All

the participants viewed the process in a positive light and intend to use games moving forward. Additionally, all participants recommended game based learning for higher education.

Conclusions

The qualitative design of this research study allowed for the examination of the unique experiences of a diverse group of instructors that are early adopters of DGBL in higher education. The semi-structured interview focused on the key questions, however the participants were encouraged to describe their unique journey to becoming early adopters of DGBL in higher education. It was not the intent of this study to advocate for the use of DGBL in higher education rather this study provided an insight into the experiences of early adopters and provides recommendations to faculty and administrators that are considering use. Drawing on the evidence presented in Chapter 4, the conclusions for the three key questions are presented.

Question 1: What was the basis of the faculty decision to implement DGBL?

The faculty defined a conflict or need within their courses and sought a creative solution. The decision to use DGBL was based on an understanding of games as a pedagogy that they acquired through reading scholarly publications, attending game based learning conferences and talking with peers.

Increase student motivation. Although each case in this study described a unique situation, game based learning was consistently implemented as a solution to a conflict or problem. Overwhelmingly, the instructors found a need to improve student motivation and engagement. The issues that the faculty encountered ranged from student inattentiveness to complete absence from the classroom. One faculty instructor summed up the situation by saying, "Half the students are sitting there on their iPhone or they are not paying attention." Another participant stated that in spite of his favorable teaching reviews, the lecture hall was "two-thirds

empty at the end." Games were used to address other issues as well. The use of games is an interesting answer to the motivation crisis experienced by these professors. Pink (1995) summarized the problems with extrinsic motivational factors like giving bonus points for participation. Conversely, intrinsic motivations are correlated with favorable outcomes. When a task is intrinsically motivating, the student will continue to perform the task in the absence of an external reward, such as a higher grade. The faculty instructors in this study provide evidence that student intrinsic motivation can be increased using DGBL. For example, one participant was thrilled her students continued with the game even after earning the top grade.

Individualized learning. Another problem or conflict faced by faculty is the need to individualize learning. One participant described a large class size and the inability to provide personal attention to each student. She explained, "Basically I had a problem. I had 500 students and one of me." She found that digital games could reach individual students in a way that would replicate what she would do in a one-on-one lesson with each student. Another participant found games could provide a way to "develop ongoing intimate relationships with them because I am seeing their individual work as they are leveling up and helping them and giving them formative feedback." A third participant described how games provided a safe learning environment for the individual student to explore and try new things while providing a safe environment for failure. Prensky (2001a) explains games provide the players the motivation to push through repeated failure and keep trying.

Team based learning. Two faculty instructors incorporated games to provide a means of teaching students to work together in teams. Collaboration is often referred to as a 21st century skill (Binkley et al., 2014). Both faculty instructors that described the need for team learning taught in medical schools. One instructor explained that with DGBL "they're being part

of a team that, that's kind of thing that I think are good for team learning." Another medical school faculty explains the importance of clinicians working together for the well being of the patient. Team based learning was introduced as a medical education strategy in 2001 and is an increasing in popularity (Thompson et al., 2007).

Personal traits. In addition to the problems identified and solved through the use of games, this research uncovered several personal traits shared by the participants that contribute to their capacity to become early adopters. Creative traits that emerged as common themes among the faculty include (a) curiosity, (b) new perspectives, (c) problem solver, and (d) time management skills. The faculty introduction to DGBL came from several sources that included: exposure during their college education, meeting attendance and peers; however, in each case it was the curiosity of the instructor that launched a personal scholastic pursuit of DGBL knowledge. Therefore, the conclusion can be drawn that the decision to implement games has even deeper roots based in the personal attributes of the instructors to be creative problem-solvers open to new perspectives and ideas.

But I'm not a gamer. It is interesting that four of the six faculty participants did not consider themselves to be "gamers" or particularly skilled at playing games. This study suggests that the decision to implement DGBL was not rooted in a personal predisposition or bias of the instructor's enjoyment of games. The decision being based in the confidence that DGBL is an effective teaching pedagogy is evidenced by the faculty instructor's attendance at game based learning conferences, self-directed learning, and exploration of the literature. Thus, the decision and subsequent implementation is the result of an evidence-based solution to the conflicts or problems they defined in their classroom.

Question 2: How do instructors balance the effort required to implement DGBL with their workload and academic responsibilities?

The participants in this study had similar responsibilities that included teaching, research, and service. Those that were prominent were: (a) flexible work schedule, (b) combining teaching and research, (c) using game templates, and (d) using personal time.

Flexible work schedule. Time management during the working day was unique to each instructor, in accordance with his or her individual schedule. One medical school participant reported a ridged work schedule due to a weighty clinical teaching schedule that allowed only one day per week for academic work. Otherwise, most participants described their time as flexible and were permitted freedom to manage their time as it benefited them. The only specific strategy that was divulged employed blocking off time for student interaction and communication from other obligations in an effort to reduce interruptions.

Combine teaching and research. Another time saving strategy that the instructors employed was combining their research interest with the game implementation. Because the participant recruitment was initially done through a literature search, all the participants in this study had planned to study the games they implemented. The studies included surveying student perceptions, motivation, engagement, game mechanics and learning outcomes. It is understood that most instructors that choose to implement games will not make game based learning a primary research interest and that combining research and teaching may not be a viable option. However, the all study participants were recipients of internal grant funding that helped supplement the time they spent developing the game. As one instructor put it, "if you are doing it anyway, and you are curious and engaged about it, and you are trying different things, why wouldn't you chronicle that?" The need for more research in the effectiveness of games was

shared across the participants in this study. Including research on the game implementation or student outcomes can provide longer term funding that would benefit continued or future instructional improvements.

Game templates. The use of commercially available templates was a time saving strategy employed by several of the study participants, described by one faculty as reducing the need to "reinvent the wheel." The online software that allows instructors to develop games by customizing ready made digital platforms with their course content. Four participants agreed that using game templates made more efficient use of their time. Three participants used the templates for individual class lessons and one instructor designed a fully game based online course. There was agreement that the cost of the software was not substantial and not considered a barrier.

Personal time. Finally, incorporating DGBL pored over into the instructor's personal time. There were no grievances voiced regarding the use of personal time, and all the participants described the game creation as being enjoyable. Personal time was spent by all the participant's playing games or watching others play games in an effort learn more about game mechanics or what seemed to be the game components that the player found most compelling or enjoyable. The time also included discussions with family and friends who played games and "like-minded" peers. One participant described it as being like a hobby and so the afterhours spent brainstorming was acceptable. Another instructor that worked on the game content and development during their personal time described it as being so enjoyable that he didn't realize how much time he was putting in.

Question 3: How did additional support (or lack of) influence the faculty experience when implementing DGBL?

The study participants received a variety of support through several sources that included: (a) internal and external grant funding, (b) demonstrative support by the administration, (c) network of peers and like-minded individuals, (d) learning support specialists. Two participants expressed a wish for an on campus "game lab."

Administrative funding and support. Each participant in this study was the recipient of internal grant funding. Two participants applied for external funding but were unable to obtain it. More encouraging is that two participants were awarded more substantial external funding as a direct result of the work made possible by the internal funding. The internal funding was used for a wide range of activities that included: faculty development, hiring professional game developers, attending conferences and purchasing commercial game platforms. The internal grants bought the time needed for one faculty to learn how to code games, noting that one additional participant has indicated the intention to learn. Three faculty instructors purchased commercial online gaming platforms and in doing so avoided the need to learn coding. The remaining two faculty instructors that implemented digital games used internal funding to hire professional game developers. The only game that was halted due to a lack of external funding was the 3D video game. Ak and Kutlu (2017) found that students did not find that 3D game environments offered an advantage over 2D. All faculty participants attended game based learning conferences with travel support provided by either the internal grant or their department administration. Three of the participants discussed the interest of the administration in DGBL and support for their decision.

Networking. Five of the six participants discussed the importance of peer support and the benefits of joining networks of "like-minded" individuals. Several instructors explained the benefit of forming communities of practice to brainstorm ideas with and learn from one another.

As stated by one participant, "It is a lot easier to do when you have someone else providing feedback, and encouragement." Networking opportunities were expanded outside the participant's institution through participation in workshops and attending conferences. In addition to meeting potential new collaborators, these venues provided access to leading experts in DGBL.

The advice to seek out stakeholders with a vested interest ensuring the institution has forward thinking attitude and can assist in directing resources toward instructional innovations was given by one of the support participants. "Identifying these connections can help you figure out ways to leverage supportive alliances and soften opposing ones" (Heifetz, 2009, p. 97) that may adhere to an "old school" philosophy and be resistant to change.

Learning support specialists. An overwhelming theme among every participant was the absolute requirement of the game to be based in sound pedagogy or learning theory, and to have clear and achievable learning objectives. What was striking was also the universal agreement that this was a weakness of the faculty instructors. A general consensus among the faculty and support participants was that the instructors were subject matter experts in their field, but received little or no training in pedagogy. Herein lies a significant barrier to game success. However, the acknowledgement of the knowledge deficit and the insight of the faculty into their weakness were accompanied by the foresight to seek assistance from instructional designers and self-directed learning. In addition to assistance with pedagogy, learning support specialists assisted instructors with incorporating the game into learning management systems and endured compliance with school policy.

Recommendations

The incorporation of a new learning technology is often a learn as you go practice that tends to be overwhelming for an already overextended faculty, resulting in underutilization of learning technologies with potential for improved student learning. DGBL has been shown to be an effective learning technology in K-12 and higher education, however higher education has been slow to acceptance and implementation. The purpose of this multi-case study was to examine the experiences of higher education faculty that have made the decision to implement DGBL as a novel pedagogic method. It helped to fill the gap in the literature regarding the decision and experiences of the early adopter of DGBL in higher education. Based on the results of this study, the following recommendations are put forth:

Recommendations to Administrators

Develop a strategic vision with excellence in teaching at the core. Inspiration for excellence in teaching should be provided by the administration. Adaptive leadership entails treating people who experiment with new ways of doing things as fountains of wisdom and ensure they are not marginalized (Heifetz, 2009). Faculty creativity and subsequent innovation can be encouraged through empowerment. The ISTE Standards for Administrators promotes visionary leadership to inspire purposeful change that maximizes use of digital age resources, and digital age learning culture that ensures instructional innovation with improved digital age learning (*ISTE Standards Administrators*, 2009).

- *Support creative work environments.*

- *Reward creative teaching.*

- *Provide institutional support through internal funding opportunities.*

- *Demonstrate interest in the faculty initiatives.*

- *Invite guest speakers and hosting DGBL seminars.*

Leadership should create new alliances between different stakeholder groups. New learning technologies sometimes require a complete rethinking content delivery in a pedagogic sound way. Pedagogy and the institutional vision should be interwoven. An approach should be developed that brings together learning support and learning technology specialists with faculty. Connections may not always be so obvious, but when they are identified, they can be a remarkable support for a change initiative (Heifetz, 2009). A change leader will promote a growth mindset by encouraging faculty to take risks and change the "judgment" mindset to a "growth oriented" mindset. This can be accomplished by being a humble leader that promotes collaboration and growth, while understanding that failed attempts at new practices are not failures, but valuable learning experiences.

- *Promote collaborative efforts to improve practice.*

- *Promote openness to new perspectives and new ideas.*

A change leader will promote a growth mindset by encouraging faculty to take risks and change the "judgment mindset to a "growth oriented" mindset (Fullan, 2011). The administration should be humble in leadership while promoting collaboration and growth, and avoid being judgmental of failed attempts at new practices. Encouragement of new ideas in an environment that understands failures occur along the path to success will permit faculty to flourish in their creative practices that will ultimately improve student learning.

An action plan that guides administrators to reflect on their approach to encourage, support and promote creative teaching practices that will result in a creative faculty and innovative curriculum is presented in Figure 11. The action plan is based on the recommendations to administrators.
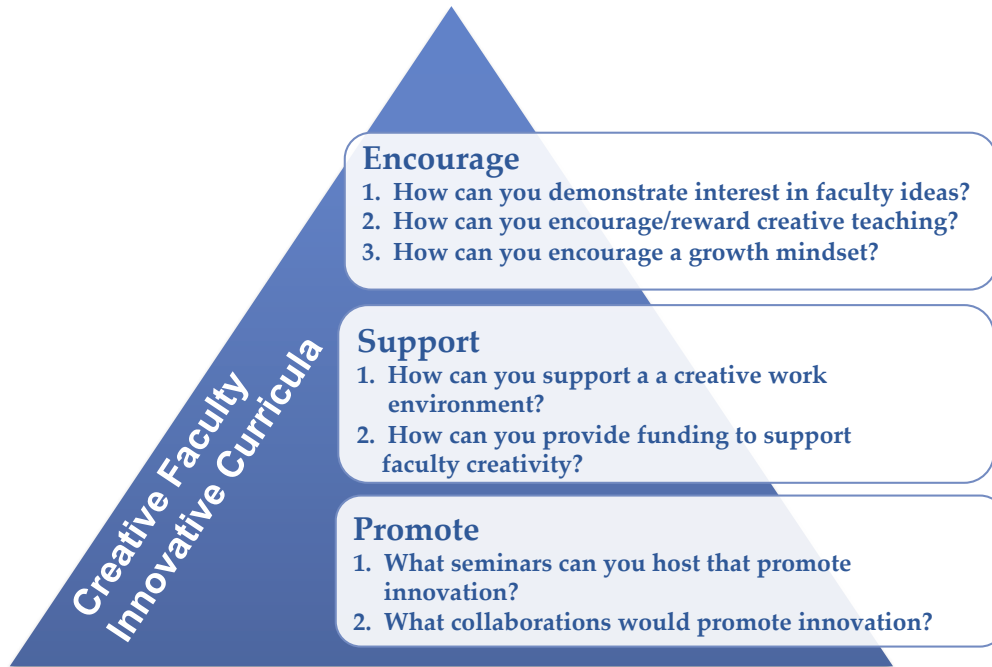
Figure 11. Administrative action plan.

Recommendations to Faculty Instructors

Time pressures and stress are known to squelch creativity. Devising a time management strategy appropriate to your unique workspace can free time to become more creative. Creative responses are beneficial and appropriate to the problem being solved. They are generally not a single "ah ha" moment, but instead require time to nurture, cultivate and mature. Additionally, time management will give time to be curious and explore new options. It is important to be open to new perspectives and ideas. As explained by Scharmer (2009, p. Location No. 2111) "only in the suspension of judgment can we open ourselves up." Finally, check your attitude inventory. If you are not interested or excited about developing a game, perhaps you shouldn't.

- *Nurture your creativity by giving yourself time to be creative.*

- *Be open to new perspectives and ideas.*

- *Are you intrinsically motivated to implement DGBL?*

The results of this research are in line with Prensky (2001a) who states that most educators are not "gamers." However, most people have played games their entire life and the basic principles are familiar. Faculty should not be deterred by their inexperience with a new technology like DGBL. Collaborations are effective gateways to learning. As explained by Fullan (2011, p. 75) "implementers learn from other implementers, especially those in similar circumstances who are further down the line." Each study participant educated himself or herself on DGBL prior to the decision to implement games. Conferences that are close to the faculty institution or attending virtual meetings can avert the cost and provide networking and collaborative opportunities. Your decision, just as those made by the study participants, must be based in an understanding of game based learning and implemented for the specific purpose of meeting student needs.

- *Identify your objective.*

- *Participate in communities of practice.*

- *Attend conferences that focus on learning technologies.*

- *Decide if DGBL can meet your objective.*

Implementing a game is complicated. DGBL, like all good instruction, must be based in sound pedagogy and learning theory. When it is decided that DGBL is a beneficial pedagogical tool, faculty are best served to collaborate with a learning support specialist to ensure that the game design will meet the learning objectives. Secondly, faculty should seek the support of like-minded peers and collaborate across boundaries. Finally, digital platforms cost money, however low cost options are available through online software and commercial gaming platforms. Funding opportunities should be sought and can provide extra time and pay for outside development or commercial platforms.

- *Seek the support of learning support specialists.*

- *Seek the support of like-minded peers.*

- *Seek the support of administrators.*

An action plan that will guide faculty in the decision making process and will result in making an informed decision on whether to implement DGBL is presented in Figure 12. The action plan is based on the recommendations to faculty.

Identify Need
- What is your objective/goal?
- What student need will be met?
- What is the learning objective?

Self Reflect
- Are you open to new perspectives/ideas and suspend and judgment?
- Are you willing to make time to be creative?
- What is your motivation?

Support
- Do you have access to learning support specialists and/or game developers?
- Do you have the support of your administration?
- Do you have support of "like-minded" peers?

Learn
- Read the GBL literature.
- Attend GBL conferences (in person/virtual).
- Learn about games by playing games.
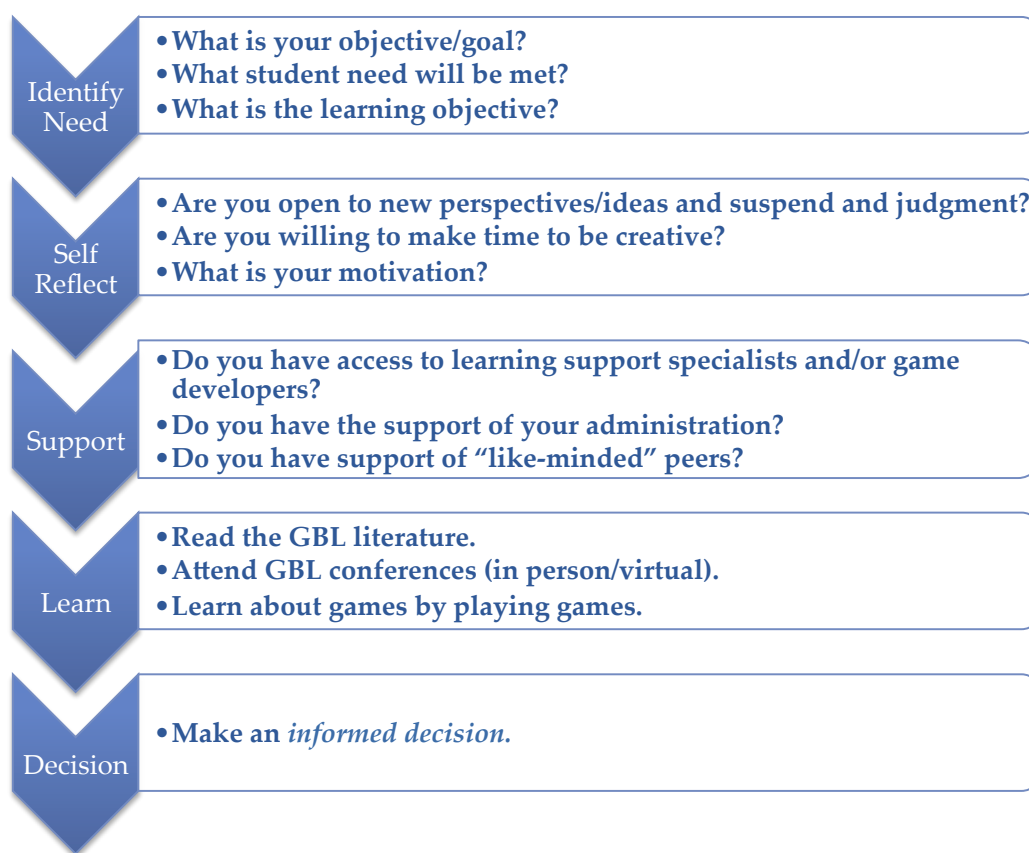
Decision
- Make an *informed decision.*

Figure 12. Action plan for faculty deciding to implement DGBL.

Finally, it is strongly recommended that faculty interested in implementing DGBL use the technological pedagogical content knowledge (TPACK) approach to address the challenges of teaching with a new technology. Defined by Koehler and Mishra (2009),

TPACK is the basis of effective teaching with technology, requiring an

understanding of the representation of concepts using technologies; pedagogical

techniques that use technologies in constructive ways to teach content;

knowledge of what makes concepts difficult or easy to learn and how technology

can help redress some of the problems that students face; knowledge of students'

prior knowledge and theories of epistemology; and knowledge of how

technologies can be used to build on existing knowledge to develop new

epistemologies or strengthen old ones.

The use of the TPACK framework will ensure that the instructor is considering the

content to be taught in relation to the student's prior knowledge and are flexible in their

approach to presenting the material. The choice of technology can constrain or improve

the information presentation and thus should never be used for the sake of using

technology.

Future Research

An overwhelming majority of the research focuses on the student experience and the

effectiveness of DGBL. In addition, two thirds of that research is focused on elementary, middle

and high school students. Continued research efforts are needed in all areas of DGBL in higher

education including student and faculty perceptions, DGBL effectiveness and methods

development. To build upon the results of this study that stresses the importance of pedagogic

and technology knowledge, a mixed methods study that assess the level of TPACK among

higher education faculty that use DGBL and the specific strategies employed by faculty to

increase their knowledge of pedagogy and technology should be examined. A model was

developed to study TPACK and game knowledge (TPACK-G) by Hsu, Liang, Chai, and Tsai

(2013) and used to study preschool teachers and in-service teachers (Chung-Yuan, Meng-Jung, Yu-Hsuan, & Liang., 2017). This same strategy could be used to evaluate higher education faculty.

To build upon this study, it would be interesting to understand the faculty self-perception of technology use. A study to determine what factors influence faculty perceptions of ease of use and usefulness of DGBL would provide administrators information on where they can leverage professional support and development faculty that will lead to an increase their confidence and knowledge base to explore DGBL and possibly other emerging learning technologies. The Technology Acceptance Model (TAM) (Davis, 1985) is a well-studied model that has value in a variety of applications. Many studies have been successful in validating modified versions of the TAM and were able to draw significant conclusions on the factors that influence a users behavioral intent to use a technology. There have been complementary studies have used the TAM to predict the use of emerging learning technologies in higher education (Akour, 2009; Marrs, 2013; Nasser Al-Suqri, 2014; Wolusky, 2016). There are no current models that have been validated that study the use of DGBL in higher education.

A final suggestion to build upon this study would be to understand how administrators define excellence in teaching and to understand the variation of the definition of "excellence" across universities. The literature contains many options for administrators to evaluate teaching effectiveness (De Courcy, 2015), yet it does not provide a clear understanding of how administrators define excellence. Furthermore, it is unclear to what degree administrators value the inclusion of novel teaching pedagogy and correlate the integration with excellence in practice. The use of an exploratory sequential design (Creswell, 2015) would be useful to first collect qualitative data through interview that will provide a descriptions of different

administrators views on teaching excellence. These descriptive terms can serve as the basis for a quantitative survey to provide insight into those qualities that are most highly regarded as contributing to excellence.

Summary

The incorporation of a new learning technology is often a learn as you go practice that tends to be overwhelming for an already overextended faculty, resulting in underutilization of learning technologies with potential for improved student learning. The purpose of this multi-case study was to examine the experiences of higher education faculty that have made the decision to implement DGBL as a novel pedagogic method in higher education. The results of this study revealed that early adopters of DGBL in higher education used the novel learning technology in response to a conflict or problem they defined in their courses. The implementation was based in knowledge of the pedagogical attributes of game based learning and were not the result of a bias developed from being a "gamer." The faculty had common creative traits that may have contributed to their ability to be successful early adopters of a novel learning technology. All the participants practiced time management, although in ways that suited their unique situation. Importantly, they were all intrinsically motivated, enjoyed implementing and using games, were willing to sacrifice their personal time to varying degrees, and found support through their administration and peers.

As new generations of learners move into institutions of higher learning, it is imperative that faculty remain current in new technologies that have, and will continue to influence the way students learn. The adaptive challenge presents uncertainty and requires an environment that promotes creativity, experimentation and trial and error (Heifetz, 2009). Higher education faculty must become effective transformational leaders that are capable of creating sustainable learning

environments that are compatible with the 21st century culture, and there is nothing wrong with making them a little fun.

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Appendix A

Drexel University
Consent to Take Part In a Research Study

1. Title of research study: Getting Into the Game: An Explanatory Case Study To Examine the
   Experiences of Faculty Incorporating Digital Game Based Learning in Higher Education
2. Principal Investigator: Dr. Allen Grant, Co Investigator: Mary Ann Comunale
3. Why you are being invited to take part in a research study
   We invite you to take part in a research study because you are higher education faculty that
   has implemented digital game based learning in a higher education setting or have supported
   the implementation of digital game based learning in higher education.
4. What you should know about a research study
   Someone will explain this research study to you. Whether or not you take part is up to you.
   You can choose not to take part. You can agree to take part now and change your mind later.
   If you decide to not be a part of this research no one will hold it against you. Feel free to ask
   all the questions you want before you decide.
5. Who can you talk to about this research study?
   If you have questions, concerns, or complaints, or think the research has hurt you, talk to the
   research team at Drexel University 3141 Chestnut Street Philadelphia, PA 19104. You may
   directly contact Dr. Allen Grant by calling 215-895-6232 or e-mailing acg48@drexel.edu .
   This research has been reviewed and approved by an Institutional Review Board (IRB). An
   IRB reviews research projects so that steps are taken to protect the rights and welfare of
   human subjects taking part in the research.
   You may talk to them at (215) 762-3944 or email HRPP@drexel.edu for any of the
   following:
   Your questions, concerns, or complaints are not being answered by the research team. You
   cannot reach the research team. You want to talk to someone besides the research team.
   You have questions about your rights as a research subject. You want to get information or
   provide input about this research.
6. Why is this research being done?
The purpose of this multi-case study is to examine the experiences of higher education faculty
   that have made the decision to be creative and innovative in their teaching practices thru
   implementing digital game based learning (DGBL) as a novel pedagogic method. This study
   is guided by the following key research questions:
        1. What was the basis of the faculty decision to implement DGBL?
        2. How do instructors balance the effort required to implement DGBL with their daily
        workload and academic responsibilities?
        3. How did additional support (or lack of) influence the faculty experience when
        implementing DGBL?
7. How long will the research last?
   We expect that you will be in this research study for two one hour interviews.
8. How many people will be studied?
   We expect 24 people will be in this research study.

9. What happens if I say yes, I want to be in this research?

You will be contacted by e-mail to set-up an interview time. Mary Ann Comunale, who is a research instructor at Drexel University College of Medicine, will conduct the interview(s). There will be no more than two interviews lasting no more than one hour each. You will interact solely with the researcher/interviewer.

The interview(s) will take place on line through use of Zoom or Skype and will be recorded. You may be at a location of your preference during the online interview. The interview(s) will take place at the participant's convenience during the months of January and February. Information will be collected on the acquisition, type and mechanics of the game that was implemented. You may be asked view the results and interpretation of your interview and artifact data to confirm accuracy. The research will be completed after the interview; game artifact collection and data analysis is completed.

10. What are my responsibilities if I take part in this research?

If you take part in this research, it is very important that you:

are willing to openly discuss your experiences with implementing digital game based learning.

tell the investigator or researcher right away if you change your mind about participating or do not want the results of your interview published.

11. What happens if I do not want to be in this research?

You may decide not to take part in the research and it will not be held against you.

12. What happens if I say yes, but I change my mind later?

If you agree to take part in the research now, you can stop at any time it will not be held against you.

13. Is there any way being in this study could be bad for me?

There are no known risks or adverse effects for participating in this study.

14. Do I have to pay for anything while I am on this study?

There is no cost to you for participating in this study.

15. Will being in this study help me in any way?

There are no benefits to you from your taking part in this research. We cannot promise any benefits to others from your taking part in this research.

16. What happens to the information we collect?

Efforts will be made to limit access to your personal information. We cannot promise complete secrecy. Organizations that may inspect and copy your information include the IRB and other representatives of this organization. We may publish the results of this research. However, we will keep your name and other identifying information CONFIDENTIAL. Confidential means that I will record information about you that could identify you, however following transcription of the recorded data the original recording will be destroyed and the transcribed data will be coded with a synonym. The information providing the link between your identity and the transcribed data will be kept separate from the transcribed interview data.

17. Can I be removed from the research without my OK?

The person in charge of the research study can remove you from the research study without your approval. Possible reasons for removal include unprofessional behavior.

18. What else do I need to know?

This research study is being done by Drexel University. You are not waiving any legal rights by participating in this research study.

Appendix B

Digital Game Based Learning Interview Protocol – Faculty

Introduction
You have been asked to speak with us today because you have been identified as someone who has implemented digital game based learning (DGBL) in your higher education classroom. This research project as a whole focuses on understanding your experiences that led to implementing DGBL and also your experiences during the implementation process. I am trying to learn more about your experiences to inform faculty who may also be interested in implementing this novel learning pedagogy

Introduction to the Protocol
To facilitate note taking, I would like to digitally record our conversations today. For your information only researchers on the project will be privy to the files, which will be eventually deleted after they are transcribed. In addition, you must agree to the consent form. Essentially, this document states that: (1) all information will be held confidential, (2) your participation is voluntary and you may stop at any time if you feel uncomfortable, and (3) we do not intend to inflict any harm. Please confirm you consent now. Thank you for your agreeing to participate.

I have planned this interview to last no longer than one hour. During this time, we have several questions that we would like to cover. If time begins to run short, it may be necessary to interrupt you in order to push ahead and complete this line of questioning.

A. Interviewee Background

How long have you been employed as a university professor?

What is your field of study?

What is your academic rank (instructor, assistant, associate, professor, tenure?)

Do you play digital games in your personal time?

B. Decision to implement DGBL

1. Do you consider your self to be creative and or innovative? Please explain.

2. How did you learn about DGBL?

3. How did you arrive at the decision to implement DGBL?

Appendix C

DGBL Interview Protocol – Staff

Introduction
You have been asked to speak with us today because you have been identified by a faculty member that is participating in this study as someone who has played a supportive role during their implementation of digital game based learning (DGBL) in a higher education classroom. This research project as a whole focuses on understanding the experiences of the faculty prior to and during the DGBL implementation process, and the support you provided might have played a role in those experiences.

Introductory Protocol

To facilitate note taking, I would like to digitally record our conversations today. For your information only researchers on the project will be privy to the files, which will be eventually deleted after they are transcribed. In addition, you must agree to the consent form. Essentially, this document states that: (1) all information will be held confidential, (2) your participation is voluntary and you may stop at any time if you feel uncomfortable, and (3) we do not intend to inflict any harm. Please confirm you consent now. Thank you for your agreeing to participate.

I have planned this interview to last no longer than one hour. During this time, we have several questions that we would like to cover. If time begins to run short, it may be necessary to interrupt you in order to push ahead and complete this line of questioning.

A. Interviewee Background

What is your position within the university?

How long have you been employed at your current position?

What is your field of expertise?

What is your experience with digital games?

B. Faculty decision to implement DGBL

1. How did you learn about DGBL?

2. What role did you play in the instructor's decision to implement DGBL?

Appendix D

Explanatory Effects Matrix: Cross Case Analysis of Narratives Data				
Common Theme	Emerging Sub Themes			
Common Theme 1	Sub Theme 1	Sub Theme 2	Sub Theme 3	Sub Theme 4
Common Theme 2	Sub Theme 1	Sub Theme 2	Sub Theme 3	Sub Theme 4
Common Theme 3	Sub Theme 1	Sub Theme 2	Sub Theme 3	Sub Theme 4

Appendix E

Explanatory Effect Matrix: Participant's Game Profile								
Case	Game Platform	Game Type	Setting	Context	Source	Funding Source	"Gamer"	Decision
Pseudonym								
Pseudonym								
Explanatory Effects Matrix. Derived from the suggestions of Miles (1994), each case will be listed by their assigned pseudonym into an explanatory effects matrix.								

Appendix F

Table F1
Dr. Trainer: Q1 In Vivo Evidence of Decision to Implement DGBL

Personal Experiences
-"I was very excited about the potential for designing online learning environment. It followed from me immediately that…if you want real game based learning the victory condition of the game and the learning objective of the game have to be the same."
-"We started going to GLS (Games Learning Society) late lamented GLS now and got to know what was going on in the research at the time and tremendous excitement."
-"Instantly captivated by the storytelling"
-"Per formative storytelling that was going on in games ... like Halo even games like Call of Duty."
-"I was very excited about the potential for designing online learning environment."
-"An epiphany moment to-- it thanks to a presentation I saw by a game designer named Ian Schreiber, who is now with Rochester Institute of Technology and he pointed out in his presentation that the learning potential of games was much greater if we are able to broaden our understanding of what kind of learning could go in game and this was before I really had any exposure to educational psychology at all."
-"I'm not an educational psychologist."
-"My imagination has always outpaced what was possible."
-"I feel like that part of my professional career was seriously accelerated by the kind of incessant failures that one has to endure when you are doing something like this."
-"I am such a strong believer in online learning."
-"I am an actor type and I love performing but I eventually just got really, really disillusioned with the lecture model."
-"And I know from my own experience even if someone who ended up as an academic that I did 80% of the learning from my courses right before the exam and then I promptly forgot everything."

Student Influence
-"I mean, one of the other challenges is that there are students who just do not want to learn this way."
-"But the problem is that because it is so complicated and it is so different from anything they've ever done before as a learning experience. There is a huge learning curve, steep learning curve."
-"For one thing I could count on the first five rows of the lecture hall being full of faces that I recognized but the lecture hall had 50 rows or so in it. And by the end of it, and this is I think partly just what happens at a big public university and I think it's partly what happens everywhere."
-"I got wonderful teaching evaluations but the lecture hall was two-thirds empty at the end."
-"The lectures were basically all I was delivering besides a whole bunch of reading that the students basically weren't doing."
-"Something had to change and one of the things I wanted to change was the instinctual feeling despite all of the advances that have been made in secondary education, the instinctual feeling that my students at least seemed still to have that somehow sitting in a seat in a classroom or even eventually not sitting in that seat in the classroom allowed them to learn just because at the end they got a grade by cramming for an exam."

Game Choice
-"I went through various periods in which I did a lot of digital gaming and also played a lot of dungeons and dragon when I was an adolescent that's hugely important for my game based learning."
-"Hello2 by Microsoft, I started playing that generation of games and was instantly captivated by the storytelling and that developed into a purely literary and kind of humanities based research interest in connections between ancient epic and philosophy and modern digital games."
-"Winning the game and mastering the skill have to be at least isomorphic in some fundamental way and that led to the first of the these games."

Table F2

Dr. Trainer: Q2 – In Vivo Evidence of Time Management Strategies

Developing the game
-" I mean one of the main iterations that I've done over the past 10 years is I've gone through various
   versions of these is kind of refine the first five emails."
-"But in the two months before that course started, I probably put in 200 hours."
-" I just took that same matrix and designed the whole thing over the summer it took that – at the time I was
   so excited about it that I didn't even realized kind of how much time I was putting in."
-"So, it made me kind of crazy because I was doing it for the first time."
-"But at the same time it was a good kind of crazy because I was so excited and because it was the first
   time any of my students had ever seen anything like this because people in the department were kind of
   excited about it too."

Student interactions
-"Between 6 am and 11 am, I work through all of the emails that came in."
- "I mean if a student really, really is distraught if I can tell that they are distraught I will answer that
   immediately. But if it's kind of the thing that they think is making them distraught but there is really no
   reason for it, I'll wait until the next morning. And that's helped because it made me for example able to
   write which – generally that was hard when I was answering everything as soon as it came in."

Course structure
 "-I was very excited about the potential for designing online learning environment. It followed for me
   immediately that you could [implement] game base learning."
-"It hasn't reduced them but it's made my time commitments fit better."
-"I have four of these that I offer in rotation now and each time I do it, I get better in at least one part of it."
-"I am such a strong believer in online learning."
-"The flip model is the one that I think is that the most compelling."
-"I am just going to continue iterating"

Table F3

Dr. Trainer: Q3 – In Vivo Evidence of Support

Peer support
- "I probably would have stopped after a year or two if I hadn't had the support – if I kind of haven't had the feedback that yes this was something that colleagues thought was interesting."

Institutional support
- "Before I did my first game based course and so really with the help of a wonderful instructional designer, I learned kind of to construct a matrix with learning objectives and activities and put it together and have it all in place before the course started."
- " My department has always been very supportive and at various times I have been able to get research assistance to help with some things."
- "Center for Excellence in Teaching and Learning which has given support at various times."
- " One thing we've thought about over the year is a game lab where we could have kind of interface with students in digital media, who could help design things more quickly and kind of add to the conversation. So, hopefully someday we'll get that but we don't have one now."
- " One thing that helped me more than anything else was accessed to instructional designers and people who look at things from an educational psychology point of view."
- "If you want real game based learning the victory condition of the game and the learning objective have to be the same."
- " There's the kind of third-dimension of I guess looking at digital games themselves and figuring out what their learning affordances where, and that was where I started to work with my colleague and the [named] School of Education."
- "It would be just so much easier to have that dedicated platform."
- "One thing I would emphasize is something I'd talked about it early on which is that you want to be sure that you nail the connection between the learning objective and winning the game or getting to the end of the game so that everything kind of flows from that."
- "As a grad student in humanities this is still true although it's getting better. I got terribly, terribly little actual training in teaching and so in fact I did not know what a learning objective was until I was five years into being a tenured- track faculty member."
"Grounding in theories of situated cognition had a very decisive impact on the way that I looked at what I was doing as I taught the courses."

Monetary support
- " Support from kind of monetary and real assistance point of view is it's kind of intermittent."
- " I wish we'd gotten the grant."

Table F4

Dr. Stevens: - In Vivo Evidence of Support For Dr. Trainer

Faculty Support
-*" When somebody is implementing, that's the first thing, I look at for the success of their
    implementation is that they are running into problems so they are theoretical problems or is it a
    practical problem?*
-*" Here is some strategies you might try to pick up, if those couple of students were lagging or if those
    students were being troublesome."*
-*" Let's talk about some of these problems more abstractly, you know."*

Pedagogic support
-*"A lot of information is lost in translation between the two because there aren't a lot of protective
    communicators you can go from the instructional side the pedagogical side to the game design side."*
-*"I think at this point it would be fair to say most of my work is design-based or instructional support."*
-*" Being a successful instructor, implementing games in the classroom means a willingness and ability to
    recognize the time and place for certain kinds of games and game mechanics, and that a game need
    not be something that's a fully digital world but it can be something as simple as a card game as long
    as it's getting you to demonstrate the skill that you want the students to have in the real world."*
-*" I can consider myself a situated cognitivist"*
-*" Most of the faculty have never even written a learning objective because it did not occur to them that
    that's something that they might want to do."*
-*" Think ahead and predict the kind of instructional challenges you are going to face as an instructor
and suit, manipulate your materials to fit that vision, whatever it happens to be."*

Game design support
-*"The first thing I always do is ask my faculty, come to me with a list of learning objectives.*
-*"Whether it's an individual lesson or if it's a full course, I will approach that very differently too"*
-*"Here are some example games that you can go and try out, look at how they work. Here is an article
    that very quickly goes through what the difference is between a game and a simulation. And then I
    want you to come back to me and tell me what you think the best fit is for you."*
-*"Then we will have a dialogue"*
-*"It becomes a sort of back and forth negotiation with whoever the content specialist is."*

Game design strategies
-*" This interactive design process that came to ADDIE for instructional design that also blended with
    what we know about technology integration classrooms through TPACK.*
-*" Am I adequately integrating the technology that we chose with a pedagogy depending what learning
    theory is kind of underpinning it all with the content, depending on what the content is."*

Institutional Support:
-"Institutionally I believe is very progressive and is forward thinking and is interested in big ideas that will
    change the way we look at the world."

Table F5

Dr. LaDuke: Q1- In Vivo Evidence of Decision to Implement DGBL

Personal Experiences
-"When I was looking into it, in our residency we do things like games like Family Feud."

Student Influence
- "Half the students are sitting there on their iPhone or they are not paying attention…this forces them to be involved and be engaged."
-"I like it and the reason I do it is because it increases interactivity with the, with our learners."
-"And some people [faculty], they do, you give your lecture or you kind of just get by."
-"Liked that interaction, but [also liked] having the [instructor] right there to ask questions."
-"Increases interactivity with our learners."
-"Provides "a little bit of friendly competition [that] keeps them engaged."

Game Choice
-"In our residency we [played] games like Family Feud…Who Wants to Be a Millionaire…Hollywood Squares… it made me start off just using it in lectures."
-"Some of the things that I thought were more interesting when I was a trainee were those types of lectures where you're getting involved in your area, kind of put on the spot a little bit,."
-"Set up and then just have them go against each other with the sort of competition being one motivator."
-"This kind of forces them to be involved and be engaged and they're being part of a team that, that's kind of thing that I think are good for team learning."
 "Thought that it would be interesting to try to do as a full project to develop a standalone game and see how it worked."

Table F6

Dr. LaDuke: Q2 – In Vivo Evidence of Time Management Strategies

Developing the Game
- "There's a lot to juggle."
- "Trying to find a balance."
- "I had additional days of the week where I could do the coding to make that specific game."
- "Personally, I think it's fun so I spend a little more time on the educational portion of it."
- "It's hard to do that unless you had some extra time to really sink in to it and learn some skills"
- "The Nearpod transit I used, I learned how to use that at a course...then it wasn't too much extra time to start incorporating my own material into it."
-"But it's been a new wrinkle is having to do with multiple different sites."
-"Well, fortunately when I was designing the game that I wrote for the paper, that was the grant bought me academic time to make it."
-*"*I had additional days of the week where I could do the coding to make that specific game."
-" Finding a good game or a template to, that you can start off with and then adding your content and personalizing it to your audience."
-"I think it's fun so I spent a little more time on the education portion of it."

Student Interactions
-"I have clinical obligations but also part of my obligations are teaching residents and other trainees."
-"It's a little trickier now is that we have to lecture to residents that are at multiple sites."

Course Structure
- "What I do is I try to, one tip that somebody had given me once is to make your talks and all your information into modules, so that you can kind of mix and match them and try to switch it up, if so, you have a talk on one thing, you can, it didn't work that well, maybe, I can move that module over to something else.

Table F7

Dr. LaDuke: Q3- In Vivo Evidence of Support

Peer Support
- "Maybe like, maybe one or two [peers involved in using games] and some other medical educators that gave me some more feedback on contents and stuff like that that they thought is not useful.
- "I mean, I think yeah definitely it's definitely doable and I think it's fun, it's basically just finding what you find interesting or you find might work for your audience, finding a good game or a template to, that you can start off with and then adding your content and personalizing it to your audience and your like you, what your field is if you could."
- "I think when people are getting into it having one kind of getting intact into a network of people who are also involved."

Institutional Support
- "For that specific class, well, we get time, we get part of an academic fund to fund us to go to trips and stuff like that."
- " Getting some potentially, either some classes serves or time to go to meetings where they could learn about these new techniques or workshops and stuff like that, it gets always helpful and I can take it back to their institution and try to implement it."
- "Somebody had recommended they thought it [funding source] will be interesting because I'd already been using games when I was a Fellow and as a junior of the faculty I was using these interactive games and then I thought that would be interesting to try to do as a full project to develop a standalone game and see how it worked."

Monetary Support
- "I got a small grant through one of our societies…so that allowed me to have time to develop the game."
- "The [organization] that gave me the grants put me in touch with some people that I could use to get feedback on it.**"**

Table F8

Dr. Brunkard: Q1- In Vivo Evidence of Decision to Implement DGBL

Personal Experiences
-*"I am really not a gamer."*
-*"I have been involved in the evidence based practice movement."*
-*"So here is a really dry, boring subject that students are coming and thinking that because it is a completely online course it is a perfect recipe for them to completely check out."*
-*"'I bumped into my colleague … who had been using a game based learning online platform for course and he had just done his first pilot and so we were chatting about that."*
-*"You know this is the bridge."*
-*" I had wanted-- been looking for an opportunity to explore game based learning more."*
-*" That was my thinking and my challenge."*
-*"I was primed and ready and knew I was going to do this and it just happened at the right time that I came across this."*

Students
- *"I think that's where the disconnect is in terms of the interest and the relevance."*
-*" My main motive was engagement"*
-*"I really wanted to engage the students."*
-*"Here is a really dry, boring subject that students are coming and thinking that because it is a completely online course it is a perfect recipe for them to completely check out."*
-*" My main motive was engagement"*
-*"As a way to improve student learning. That was my motivator. That was my driver."*

Game Choice
-*" There are no accidents, and I bumped into my colleague [name],who had been using a game based learning online platform*
-*" I went back right away and started investigating it and looking at who were the developers, how does it function and I had been reading alongside more about game based learning and motivation."*
-*"I started looking at 3D Game Lab which is now called Rezzly and said, yeah I can make this work."*
-*"It's kind of a cloud based subscription so it's available to anybody who wants it."*

Table F9

Dr. Brunkard: Q2- In Vivo Evidence of Time Management Strategies

Developing the game
-*"Able to build my own stuff was probably a couple of weeks."*
-*"That's on top of the teaching load and everything else that I was doing."*
-*"This was kind of in my spare time basically."*
-*Because I was a brand new professor to this university, in my first year I got a course of release time for doing development of courses and that kind of stuff and getting my research up and going."*

Student interactions
-*" I also at the same time put in an ethics application to say this is going to be a pilot test of this new pedagogical gaming platform."*

Course structure
-*" I am a big fan of double word scores, right?"*
-*"Combine your research and your teaching together and not separate, you get a double whammy,"*
-*" If you are doing it anyway and you are curious and engaged about it and you are trying different things, why wouldn't you chronicle that?"*
-*" So that's kind of my passion and my niche so I have cobbled that together."*
-*" You get more grants, you build more infrastructure."*

Table F10

Dr. Brunkard: Q3- In Vivo Evidence of Support

Peer support
-"Hey, here is my prototype. This is my Excel spreadsheet. What do you think?"
-"It was the fine-tuning and just the validation that I wasn't crazy and this was actually good instructional design and the support for that
-"We have kind of grown with that and now as a result,

Institutional support
-" Making sure you got it right, being able to check that with somebody who has more teaching experience or more instructional design expertise than you do."

Monetary support
-" I used my professional development fund"
-"We have developed from that research grant is we have done a number of workshops for faculty,"

Game platform support
-"To be able to build courses and to be able to build your content in the platform that they have, you do faculty development in the game.
-"To get through all of the faculty development pieces and be able to get the status to be able to build my own stuff was probably a couple of weeks."
-"On YouTube and they are kind of ted like."
-"They do have helpdesk which in my experience of using this Game Lab and having now colleagues who have gone on to use it, it's been very responsive"

Table F11

Ms. Steel: Q3- In Vivo Evidence of Support for Dr. Brunkard

Faculty Support
-"I was like, hold on...we have a commitment to the students where we have to at least give them [course outline and grades] inside the LMS."
-"She wasn't aware of that policy."
-"It's up to our unit to be aware of what those rules are and help that the instructors are meeting those guidelines."
-"I was trying to find a way to help her get it done."
"I've been supporting this course for quite sometime."

Pedagogic support
-"Support the incorporation of technology into the curriculum in pedagogically sound ways."
-"It's mastery learning."
-"In terms of understanding gaming elements and choice…we have been doing that for years."
-"One of the big things is self-directed, choice in their learning."
-"The element of competition, that really depends on your audience too."
-"Make the content more relevant to the student."
Game design support
-"I was going to help out the students too if they ran into any trouble with the system."
-"They do enjoy all the gaming elements...they need that connection [to instructor]."
-"We call it dipping your toes in gaming."
-"Some of the participation marks are not actually participation, it's questing."
-"When ever you get into a land of new technology we have some privacy concerns, freedom of information and privacy act, stuff like that."
-"I did an orientation for [the students] to 3D game lab, kind of a step by step instructions…inside their e-class site of the LMS."
-"Midway through the course they need to have some sort of interaction with [the instructor]."
-"We fine tuned it down to addressing some of the [student] concerns."
-"Some of the instructors had 70 students in their class and there's no way they can do that level of student feedback."
-"Get it inside a system they already know."
-"What they like about some of the quests is the individualized feed back from the instructors."
-"Take the baby steps. Don't try to do a whole course right out of the gate."

Institutional Support:
-"We have a learning management system in place."
-"We had rules around using their ID's."
-"The administration is fundamentally aware of the need of the faculty to be supported in their teaching."
-"Innovation is rewarded."

Table F12

Dr. Pekala: Q1- In Vivo Evidence of Decision to Implement DGBL

Personal Experiences
- *"We wanted to not only see if the games work but also how they work and whether they work in different disciplines."*
- *"We had a really tight knit group of people in the department who were interested in gaming."*
- *"The faculty who participated had various levels of interests and experience with gaming."*
- *" I was familiar with that whole discourse coming from critical pedagogy and a background in pedagogy from my graduate study days."*

Students
- *"I love educational videogames as I think that they really grab students."*
- *" a lot of what game-based learning offers is that ability to kind of really reach students, engage them and help them do some hands-on work."*

Game Choice
- *It was totally grassroots.*
- *"We wanted to test the feasibility of coming up with game-based assignments on our own and seeing if they work"*
- *"Seeing if that's a viable way to do game-based learning without having to have a crew of consultants design something or like I said take something already built."*
- *"We gave them some proxies and they came in with a design and we play-tested it, we iterated it."*

Table F13

Dr. Pekala: Q2- Evidence of Time Management Strategies

Developing the game
- *"You have to come up with an assignment anyway, write a lesson plan."*
- *" It's not so much that I would have to sit for hours and craft this finely tuned game. It's more like just being intentional and conscious about the game design principles that I want to incorporate into whatever lesson plan I was doing for the day."*
- *"I didn't feel like I was spending more time than I had in the past. I felt like I was getting more out of my effort."*
- *" There's no sense in like reinventing the wheel if you already have a game mechanic or a set of mechanics that work really well together. And that's a timesaver, right? And that's what we did."*
- *" I mean I think gaming works really well with a flip classroom approach."*

Student interactions
- *"A lot of what we do is teach students with basic writing skills, the need to improve their basic writing skills, reading skills"*

Course structure
No evidence.

Table F14

Dr. Pekala: Q3- In Vivo Evidence of Support

Peer support
-"We're very active working with our teaching and learning directors"
-"We had a little faculty interest group around game-based learning on campus."
-"We'd given lots of presentations at the other community campuses, about 23 campuses in the system"
-" It's a lot easier to do it when you have someone else providing feedback, encouragement."

Institutional support
-"There was also a big faculty development component to it."
-"This was like a very low tech, low cost approach but it required us to do a whole semester of training which was fun."
-"My college president who one summer was very interested and in fact that's how we got funded."
-" At different points in the process, different administrators who've taken an interest in what we're doing have opened doors for us and made it possible for us to expand."

Monetary support
-" We had a previous internal grant to just kind of explore game-based learning"
-"We were internally funded to develop this game-based LMS."
-" We had some travel money attached to our development budget"

Game platform support
-N/A – was developed in-house

Table F15

Dr. Murphy: Q1- In Vivo Evidence of Decision to Implement DGBL

Personal Experiences
-*"I'm not a quick uptake, I'm not an enthusiastic app taker unless I can I can see it as a very clear and unique proposition that the software offers."*
-*" I don't see technology as a solution in itself. "-*
" I am classic female puzzle logic game person."

Students
-*" Basically I had a problem. I had 500 students and one of me."*
- *They never adjust, and then they just struggle the whole time."*
-*" Some people like the scoring, some people just like the play, and that they don't care about the score."*

Game Choice
-*"What they clearly needed was a lot of practice and exposure and repetitive practice on a number of basic linguistic points, particularly vocabulary of listening skills and various sorts of things like that."*
-*" They rarely get like listening exposure."*
- *"I really did just need something to deliver in time and in a fun way."*
-*" The personalization of the avatar who actually is running the student uniform that we all our students wear here."*
-*" And is reinforced over and over"*
-*" It sort of meets a number of needs."*
-*" How can you achieve that any other way?"*
-*" I actually wanted to replicate what I would do in a classroom or what I would one on one with the student, okay."*
-*" I looked at successful game models which people spend money on, and thought about how I could do that."*
-*" It gave me enough ideas to brainstorm."*

Table F16

Dr. Murphy: Q2- In Vivo Evidence of Time Management Strategies

General Strategies
-*"I say no to people."*
-*"I set very realistic time lines for things."*
-*" In other words if work doesn't pay, if it's not on working hours, or if I do stuff outside of working hours I claim back the time."*

Developing the game
-*" Alright how can I model my game on something that already exists and has worked, or while and has successfully operated for a couple of years."*
-*" So I probably spent about a week doing that"*
-*" I literary do everything that a proper academic lecturer will do."*
-*" So in other words the generation of low level assets is incredibly easy once you've made the massive asset, the game."*
- *I'm going to start doing job scripting in Haitian or small quiet coding myself so I don't actually have to really on anybody else."*
-*" Why I did the sort of creative lazing around work at home if I feel like it rather than sort of sit there and discuss it with a friend or my husband or so on and so. Hmm I'm trying to get them to do this, and then that's when I'll have the more relaxed brain storming time."*
-*" I did actually take extra time, my personal time, but I mean it's a bit hobby as well."*
-*" You know you have lots of small moments where you just get ideas and inspirations just jump into your head."*
- *It's imperative that time management is done in a way that serves your needs rather than you're constantly seeking out efficiencies. And constantly seeking out efficiencies that actually kills creativity."*

Student interactions
-*" I'm actually expected to do face to face and online teaching."*
-*"I don't answer e-mails on a weekend."*

Course structure
-*" It was very time consuming."*
-*" The game comes off that database."*
-*" I guess I am fairly organized so that helps."*
-*" You've got to think about, so of course platform issues."*

Table F17

Dr. Murphy: Q3- In Vivo Evidence of Support

Peer support
-*" Only as of like this year but on only one thing,"*
-*" I'm now trying to do is help prompt students into going through case scenarios and critical thinking case scenarios. It's going to be a game but not in terms of the flash game."*

Institutional support
-*" Our university does like innovation."*

Monetary support
-*"* I was part of an international award"
-" I did apply for internal grant money for it."

Game platform support
-"They will totally suck every cent of out of you without necessarily producing the results that you think."
-" Unfortunately it got a lot of people that do just charge too much for product that will fail over [time], partly because of coding issues and not having full awareness of the compliance and interactions with other platforms, with other software"

Table F18
Dr. Lee: Q1 –In Vivo Evidence of Decision to Implement DGBL

Personal Experiences
-"The second thing I learned watching my kids play these games was that they would memorize vast quantities of entirely useless information in order to win the game. "
-"They would get killed about a thousand times against an adversary until they memorize what corner he was going to be behind, how many times it took to shoot him, how many different groups of enemies they would encounter before they got to the final fight, where you had to hit the people for the fight until they could do it perfectly.
-"Once they beat a level, they remember how to beat a level even if they hadn't played the game six, twelve months later."
-"My thinking was, well if they can memorize vast quantities of useless information, why don't we have them memorize vast quantities of useful information in a game?"
-"I had one kid who, when he was in high school would play one of these massive multi-player online role play games where he and his friends would meet up at a certain time in a certain server and in order to be successful and achieve the goal of the mission they would need a thief and a cleric and a magician and a warrior, and they would go off, slay the monsters, rescue the princess, get the gold and everybody would be happy."
-"They had to have one of each. Because if they didn't, they would fail."
-"I'm terrible the only thing I can do is bowl on the Wii, and that's because it doesn't require specific controller just all I have to do is move." [Laughter]
-"I have a whole family of nerds," [Laughter] "and none of them are doctors, they're all gamers."
-"I have a lot of gamers in my family. Everybody in my family is a gamer, designs games, makes games. I am a terrible gamer, I can't even make it through *Mickey's Magic Golden Hoops* by myself." [Laughter]
-"[My specialty] is "by nature accustomed to thinking in teams."

Student Influence
-"In a lab people do, so there is some kinetic learning but not as much."
-"That doesn't mean that's necessarily the way people are best going to learn and remember it."
-"If you are looking at people being visual, auditory, or kinetic learners, the vast majority of people who succeed in graduate schools are visual learners because that's what you have to be good at in order to get that far."
Game Choice
-"I was looking at him playing one day and I said, "Gosh, hey that's just like the [medical] team, except we have a doctor, and a pharmacist and a nurse and a social worker.""

Table F19

Dr. Lee: Q2- In Vivo Evidence of Time Management Strategies

Developing the Game
-"Well for the first couple years, well we had funding. I actually had 5 percent of my time assigned to this grant. It wasn't pay time, but it was assigned time."
-"The initial pieces of the game design and the data collection took at first an enormous amount of time and much of it was done in the after-hours time."
-"After that really all the work with trying to write the grant applications and things, this was really just on my own time, in the evenings or if it was during the day, I shifted something else to an evening that would normally would have been done during the day."
-"It's going to take longer than you think. [laughter] It's fun but it's going to take longer than you think."
-"Even something that sounds small is not small [laughter] it takes more than you think.."
-"You are going to need at least four technical people, even in a small company, who are sort of assigned to do your stuff at a certain rate."

Student interactions
-"I had one kid who, when he was in high school would play one of these massive multi-player online role play games where he and his friends would meet up at a certain time in a certain server and in order to be successful and achieve the goal of the mission they would need a thief and a cleric and a magician and a warrior, and they would go off, slay the monsters, rescue the princess, get the gold and everybody would be happy. But they had to have one of each. Because if they didn't, they would fail"

Course structure
-"Right now it's not incorporated into the existing curriculum."
-"We don't have the funding support to pay the company to maintain the website to collect the background information and operate and troubleshoot the game for the students, for them to be able to go in and play and use the game. The game exists. The website exists.

Table F20

Dr. Lee: Q3- In Vivo Evidence of Support

Peer support
-*"*The second thing I would say is to find like-minded people to be your support."
-"Had my colleagues from psychology and from the college of education who are willing to do the educational analysis."

Institutional support
-**"**My department chair is very supportive of this."
-**"**He thought it was really innovative, and so he didn't care that I was spending my own time on these things instead of the other things I might have normally spent other times [laughter] which is kind of a funny way to put it."
-"We had enough money to do the first level of the game, and so when that was done then we had to go look for additional funding of some type."

Monetary support
-"Well for the first couple years, well we had funding. I actually had 5 percent of my time assigned to this grant. It wasn't pay time, but it was assigned time.
-"Some seed money remaining from a [science] innovation grant that we had here in my department that they had originally budgeted for another reason, but wound up not needing for that particular reason. I talked to the other people in my department and they said sure, you guys could use that if you want to use it as the seed money to create this game."
-"It actually costs a substantial amount of money to pay for a game designer, programmer and artists to make all the stuff in a game."
-"They gave us a huge discount because they saw this is being something they could potentially develop or use skills for as well with other people."
-"Without funding you cannot pay people to actually do the game development and to create a programming in the art and everything like that."
-"It costs a substantial amount of money to pay for a game designer, programmer and artists."