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Middle School Teachers' Use and Perceptions of Digital Game-Based Learning

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Abstract

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MS, University of Nebraska, Kearney, 2011

BA, York College, 2005

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Studies have shown that digital media and digital games can enhance students' learning experience. However, few teachers appear to use digital game-based learning (DGBL) regularly. The purpose of this qualitative study was to understand how middle school teachers use DGBL in the classroom and the factors that positively and negatively influenced their choices to use DGBL. Rogers's diffusion of innovations theory framed the study. Research questions examined how middle school teachers use DGBL in the classroom, what they view as positively and negatively influencing decisions to integrate DGBL, and differences based upon the point in their teaching career when they began using DGBL. Eight purposively selected middle school teachers who have integrated DGBL were interviewed. In vivo and pattern coding were used in analysis. Findings indicated that teachers use DGBL to engage students in content, support skill building, promote teamwork, individualize learning, and for feedback and classroom management. Factors that positively influenced adoption included teachers' own gaming experiences and perceptions of positive influence on lesson planning, classroom management, and students. Negative influences included technical difficulties, lack of self-efficacy, perceptions of students being distracted, time constraints, and the need for back up plans. There were some differences between number of years participants had been using DGBL. By better understanding how and why teachers use DGBL, policy makers, administrators, and preservice and professional development providers can develop strategies to better support DGBL use, which will benefit students' learning.

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Dedication

To my beloved wife Kimmie, and my children Marie and Sawyer for their unwavering support and encouragement while I finished my dissertation.

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During data collection my participants were pivotal in accomplishing my interviews and dissertation. I would be lost without them so, thank you! I would also like to thank my family members Richard and Ruth Vogt, Becky and David Dultmeier, Jana Estaniqui, and Abbie Clang for always asking questions and their positive support, which helped keep me going. Finally, to Peru State College for your encouragement and patience throughout this journey.

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Chapter 1: Introduction to the Study

Games have long been a source of controversy and widespread debate about their effectiveness in the field of education, and digital gaming is no different (Whitton, 2014). Teachers' views about the effectiveness of digital gaming in the classroom vary. Several studies have shown how connected students are with digital media (Armitage, 2015; Lenhart, Smith, Anderson, Duggan, & Perrin, 2015; Rideout, 2015). Furthermore, numerous studies show the positive benefits of digital gaming as an effective tool for enhancing the student experience (Prensky, 2014; Shaffer, 2006; Squire, 2011; Vander Ark, 2012; Whitton, 2014). Further, research shows the benefits of incorporating digital games into the classroom such as (a) improved student achievement (Hess & Gunter, 2013), (b) better student collaboration (Pareto, Haake, Lindstrom, Sjoden, & Gulz, 2012), (c) increased student motivation (Yang, 2012), (d) enhanced student engagement (Hamari et al., 2016), and (e) improved critical thinking and problem solving (Eseryel, Ge, Ifenthaler, & Law, 2011). Even though digital gaming has been shown to be a highly effective tool in the classroom, Pivec (2006) stated that gaming has not advanced that far in the last 30 years. Although this may have been true in 2006, gaming today is much more widespread, especially digital gaming, and can be seen in many schools across the country (Takeuchi & Vaala, 2014). With so many pointing out the benefits of digital gaming, a question remains regarding why digital game-based learning (DGBL) is not more prevalently used in schools across the country. To this point, Takeuchi and Vaala (2014) reported that 45% of the K-8 teachers surveyed use digital games only once a month or less and 26% never use digital games in their classrooms. None of these studies

focus specifically on middle school education, or the middle school teacher's perception. To this end, it is appropriate to better understand why teachers do or do not incorporate such tools in their classrooms. By better understanding teachers' decisions regarding digital games in the middle school classroom, school districts across the country can formulate more robust plans to address integrating DGBL to benefit students. One group that is at the forefront of incorporating technology of all types into their classrooms are members of the Nebraska Educational Technology Association (NETA). Therefore, I considered members of this group as participants for this study.

This chapter includes the background of the study, the problem statement, and my purpose in the study. Furthermore, the research questions, theoretical framework, and nature of the study are described. I conclude Chapter 1 with the definitions, assumptions, scope and delimitations, limitations, and the significance of my study.

Background of the Study

Games have been around for centuries. However, it was not until the late 1960s and early 1970s that research in the effects of using games in the classroom started to gain momentum (Reiser, Gerlach, & Barron, 1977). In its infancy, research on gaming in the classroom was disorganized; Fletcher (1971) brought this issue to light through a study on finding common variables for conducting studies about games in the classroom. Ultimately, Fletcher wanted future researchers to look at two dependent variables, which were (a) claims about what games *are*, and (b) claims about what games *teach* (p. 432).

Continuing research on games in the classroom, DeVries and Edwards (1973) mentioned that learning games involves any activity where students use previous

knowledge or skills to compete against other students. In fact, they go as far to say that a spelling bee could be considered as a game. This narrow focus on games, however, opened a broad umbrella as to what can be considered a game. Furthermore, DeVries and Edwards (1973) mentioned how important reinforcement is and how learning games naturally reinforces students through frequent and immediate feedback. This reinforcement echoes the studies of behaviorists such as Skinner (1969).

Researchers continued to focus on the performance oriented and immediate feedback aspects of games showing how beneficial games could be when used in appropriate settings (Baker, Herman, & Yeh, 1981; Jacobs & Baum, 1987; Reiser et al., 1977). In the late 1980s and early 1990s, research on games appeared to have a heavy focus on reviewing the research on games from previous years (Randel, Morris, Wetzel, & Whitehill, 1992; Shubik, 1989). Based on those results, games could be used to improve student motivation and learning if those games fit into the subject matter, and the games were designed with pedagogy in mind.

In the 1990s and early 2000s, the shift in research began to move from tactile games, such as board and card games, in the classroom to digital games. The studies conducted on digital games in education abound and cover many aspects, such as motivation experiences, game design, and flow experience (Garris, Ahlers, & Driskell, 2002; Kiili, 2005; Liestøl, 2003). However, one of the areas where insufficient study has been conducted is on teacher choices to bring digital games into the classroom. A major study in this area is from Stieler-Hunt and Jones (2015), which described teachers'

enthusiasm for DGBL in Australia. Nevertheless, their study did not explore the challenges teachers faced when incorporating DGBL in classroom instruction.

One study that did address this topic was Baek's (2008) exploration of Korean teachers' perceptions of roadblocks to using computer and video games in the classroom. From this quantitative study, Baek discovered six factors that inhibit teachers from using DGBL in the classroom. They are (a) inflexibility of the curriculum, (b) negative effects of gaming, (c) students lack readiness, (d) lack of support materials, (e) fixed class schedules, and (f) limited budgets (p. 669). Although these factors hold true for Korean teachers, it has yet to be determined whether the same or similar results will be found with U.S. teachers. Furthermore, a more current study would be useful to determine whether modern updates to technology have influenced teacher decisions to use DGBL.

Problem Statement

According to a survey conducted in 2015, 92% of teens reported going online daily (Armitage, 2015). Another study reported that "72% of all teens play video games on a computer, game console or portable device like a cellphone" (Lenhart et al., 2015, p. 41). Another study mentioned that teens spend an average of 9 hours a day on entertainment media, and this does not include time spent at school or on homework (Rideout, 2015). With this kind of competition for students' attention during adolescence, it is becoming increasingly important to engage middle school students in the field of education. DGBL has been shown to be a highly effective resource in the classroom, if the digital game is used effectively (Gelles, 2012; Hsiao, Chang, Lin, Chang, & Chen, 2014; Ray, Faure, & Kelle, 2013). The problem is that little evidence exists to help

teachers, administrators, and professional development leaders in middle school understand why teachers adopt or reject DGBL into their classrooms. By understanding the adopters and rejecters of DGBL in the classroom teachers, administrators, and professional development leaders can better formulate ways in which educators can effectively bring DGBL into the classroom setting. Discovering these reasons could also encourage positive social change by helping add another tool for middle school teachers' use in the classroom to heighten student engagement and motivation.

Purpose of the Study

My purpose in this basic qualitative study using interviews was to understand how teachers are using DGBL in the classroom and their perceptions of factors that positively and negatively influence their use of DGBL in their classrooms. I also explored potential differences in use and perceptions based on when in their teaching experience they began using DGBL. For this research, DGBL was defined as the use of digital games in video, computer, or app format to help improve student learning and comprehension of curricular concepts.

Research Questions

Research Question (RQ) 1: How do middle school teachers describe their use of DGBL in the classroom?

RQ2: What factors do middle school teachers view as positively influencing decisions to integrate DGBL into their classrooms?

RQ3: What factors do middle school teachers view as negatively influencing decisions to integrate DGBL into their classrooms?

RQ4: What are the differences in how teachers describe their experiences between those who adopted DGBL within 3 years after they started teaching (innovators), those who adopted DGBL 4 to 7 years after they started teaching, and those who adopted DGBL 8 or more years after they started teaching?

Conceptual Framework

The major framework that supports this study was that of Rogers's (2003) diffusion of innovations theory (DIT). DGBL is an innovation in the field of education. Some educators adopt DGBL, whereas others reject using DGBL. Rogers (2003) mentioned that adopters accept an innovation and use it in place of more traditional methods, whereas rejecters are those who do not adopt an innovation. According to Rogers's (2003) DIT, rejecters might not accept an innovation due to it offering a low relative advantage. In other words, educators might not see the advantages that DGBL provides over traditional classroom teaching. Another possibility is that DGBL is not compatible with today's classroom setting, or something might be keeping DGBL from reaching its full potential. Further, DGBL might be too complex. According to Rogers, overly complex innovations could keep people from seeing the benefits of an innovation. That is, educators might be perceiving DGBL as too complex to incorporate into their classrooms.

Through DIT, Rogers (2003) attempted to explain how innovations are adopted, positing that innovations are more widely adopted when they meet the needs of individuals and groups. The theory focuses on five factors that influence adoption of an innovation: relative advantage or the degree to which the innovation is seen as better in

some way, compatibility with existing values and practices, simplicity and ease of use, trialability or the ability to experiment with the innovation, and observable results. How individuals perceive these factors affects their propensity to adopt the innovation. Rogers identified five different groups related to their propensity to adopt an innovation: innovators (the first to adopt), early adopters, early majorities, late majorities, and laggards.

The interview questions in this study did not directly ask about the five factors that influence adoption. Instead, asking teachers about the factors that they viewed as enablers and impediments provided an opportunity to determine whether Rogers's factors were at play in decisions to adopt DGBL and how they influenced teachers' choices. Understanding middle school teacher perceptions of enablers and impediments to adoption of DGBL in the classroom provided insights into how the factors identified by Rogers are or are not important in teacher decisions to use DGBL. Application of the framework to the study informed where middle school teachers were on the adoption continuum and how use of DGBL was progressing in terms of diffusion.

Nature of the Study

A qualitative interview study was appropriate for this research. Patton (2015) mentioned that a well-conducted interview can tell us just as much, if not more, than quantitative data. Several qualitative approaches exist, but I deemed best the use of basic qualitative research design using interviews of master middle school teachers from NETA using DGBL in their classrooms.

Definitions

I used the following definitions operationally in this study:

Adopt/adopter: A decision to make full use of an innovation as the best course of action available (Rogers, 2003, p. 473).

Classroom integration: Use of technology in the classroom for instructional purposes (Uluay & Dogan, 2016)

Digital game-based learning: The use of digital games in either video, computer, or app format to help improve student learning and comprehension of curricular concepts (Prensky, 2007).

Game: An activity that requires a player or players to follow a set of rules, which tell the players what they are allowed and forbidden to do. Each player takes turns, whether simultaneously or consecutively, to achieve the goal of the activity, which is known from the beginning of the activity (Whitton, 2014).

Middle school teachers: Classroom teachers for fifth, sixth, seventh, eighth, and ninth grades, members of NETA who have used DGBL in their classrooms for at least 3 years and longer.

Reject/rejecter: A decision to not adopt an innovation (Rogers, 2003, p. 476).

Assumptions

I made several assumptions in this study. First, I assumed that participants would be truthful in their responses to the interviewer. Second, I assumed that the participants selected for the study represented a broader population of middle school educators. Finally, I assumed the participants of the study had enough understanding of DGBL to be

able to make decisions about how and why they incorporated it into their instruction. It was assumed that those who had been teaching for at least 3 years would have sufficient teaching experience to provide insightful responses. According to the Nebraska Department of Education (2016), it takes at least 3 years to be considered a master teacher.

Scope and Delimitations

A delimitation of this study was that it was confined to only middle school teachers in the NETA organization who had at least 3 years of teaching experience and at least some experience with DGBL. I selected middle school teachers due to the limited research on this population, and I restricted the scope to those with 3 years of teaching experience to ensure adequate experience on which to base perceptions. Each school and teacher implement DGBL differently; therefore, I could not account for the perceptions of all middle school teachers when it comes to DGBL. However, in the study, I compared responses of teachers who adopted DGBL at different points in their teaching careers. Furthermore, I limited my study to those teachers who met the criteria and worked in Nebraska. They formed a small purposeful sample of eight teachers.

Limitations

A limitation in this study was the small sample size, which limits utility and generalizability. Furthermore, Nebraska teachers using DGBL may not represent teachers in other parts of the United States because of the rural nature of the state, which may not reflect what happens in urban or other type school settings. In addition, I focused on only teachers who were members of NETA, which does not represent all teachers in the state

of Nebraska. Also, I relied on teachers being truthful in accurately identifying themselves as having used DGBL and as having at least 3 years of teaching experience. Another limitation was that participants may not have answered the questions truthfully during the interview or may not have remembered accurately. Finally, only middle school teachers were represented in this study. Therefore, teachers from other levels, elementary and/or secondary, may not share the same views about DGBL.

Significance of the Study

This study has the ability to affect future research, practice, and policy for schools, and/or districts related to incorporating DGBL in their settings. My findings may be of significant interest to educators, administrators, and professional development leaders who want to bring effective tools to their classrooms to engage and motivate students. Better understanding of how teachers think about the use of digital gaming in the classroom can lead to insights useful in preservice and in-service training and can provide insights to administrators on how to best support DGBL integration in the classroom.

Significance to Practice

This study has the potential of contributing to the field of education by examining what factors teachers are considering when making decision to adopt or reject incorporating DGBL into their classrooms. By better understanding what influences teachers to adopt or reject, administrators, and professional development leaders will be better informed in how to support teachers and avoid rejection when incorporating DGBL in the classroom.

Significance to Theory

This study adds new knowledge to the already existing information on DGBL in education. Furthermore, the study shows future researchers what teachers might experience in incorporating DGBL into their classrooms and factors that influence their choices and whether those factors differ among those who adopt DGBL early in their career and those who adopt later. In addition, this study further adds to the knowledge base for the diffusion of innovation theory by examining factors that influence classroom adoption when it comes to DGBL.

Significance to Social Change

A need exists in education to expand the tools and resources teachers use in the classroom. DGBL can be a valuable tool and knowing the factors that influence teachers to adopt or reject it can help change the educational environment for both students and teachers.

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Summary and Transition

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In Chapter 1, I reviewed the history of games in the classroom through modern digital games. One problem facing middle school teachers is their challenge to engage and motivate students in a world where they are surrounded by technology daily. DGBL is one tool that could help motivate students in the classroom. Therefore, my purpose in this study was to better understand middle school teachers' use of and factors that positively and negatively influence their choices to use DGBL, a tool that has shown significant improvement in the area of engagement over traditional teaching methods. Rogers's (2003) DIT provided the conceptual framework for this qualitative interview

study. I defined operational key words and provided the assumptions, scope,

delimitations, and limitations. Finally, I discussed the significance of the study to help

educators, administrators, and professional development leaders understand the factors

that influence teachers to adopt or reject DGBL. In Chapter 2, I look at the current

literature on how DGBL effects students, as well as how preservice and in-service teacher

currently view the use of DGBL in the classroom.

Chapter 2: Literature Review

Researchers have made claims about the benefits of appropriately bringing technology, in particular digital gaming, into the classroom (Prensky, 2014; Shaffer, 2006; Squire, 2011; Vander Ark, 2012; Whitton, 2014). According to Pivec (2006), games, digital or otherwise, allow the teacher to be in their natural state of helper or coach, guiding the students to oversee their learning instead of the teacher directing the students where to go and what to discover. This type of self-discovery is a powerful tool in the classroom, and according to Bloom's taxonomy evaluation is one of the highest levels people can reach (Krathwohl, 2002).

Better understanding of the factors that influence teachers to adopt or reject the use of DGBL in the classroom can lead to insights useful for professional development of middle school teachers who often struggle to maintain student engagement. Therefore, my purpose in this basic qualitative study using interviews was to understand how NETA teachers were using DGBL in the classroom, and what they perceived as the factors that positively and negatively influence their choices to incorporate DGBL in their classrooms.

This literature review first includes the literature search strategy followed by a discussion of the conceptual framework. From there, I review the literature in the history of games and learning, which provides a base of information for the newest iteration of digital games. Research on digital games and their effects on learners is next discussed by focusing on five major themes: (a) student achievement, (b) student collaboration, (c) student motivation, (d) student engagement, and (e) critical and analytical thinking skills.

Finally, I consider literature on preservice and in-service teacher perceptions about bringing technology into the classroom overall and DGBL in particular.

Literature Search Strategy

While researching DGBL, I had full access to several well-known online educational databases. These databases included ERIC, Education Research Complete, SAGE Premier, Teacher Reference Center, and ProQuest Central. Through these databases, I searched for information using numerous key search terms from books, peer-reviewed journals, and dissertations from the last 5 years, which center on the topics of DGBL, the DIT, and teacher experience/perceptions of digital gaming. While conducting my review of the literature, I searched for the following terms about DGBL in the aforementioned databases: *digital gaming*, *digital game-based learning*, *digital game-based learning in Middle School*, *serious games*, *educational games*, and *serious and educational games in Middle School.* Under the concept of diffusion of innovation, I used the following key terms: *diffusion of innovations*, *Rogers* and *diffusion of innovations*, and *diffusion of innovations theory.* Under the concept of teacher experience/perception of digital gaming, I searched the following key words: *teacher attitudes* and *digital games*, *teacher experiences* and *digital games*, *teacher perception* and *digital games*, *teacher attitudes* and *educational games*, *teacher experiences* and *educational games*, and *teacher perception* and *educational games.* By far, the most helpful databases were ERIC, and LearnTechLib, formerly known as ED/IT Digital Library.

Conceptual Framework

Rogers's (2003) DIT provided the framework for this study. The reasoning behind using this theory comes from looking at how DGBL has entered into the field of education. Rogers (2003) mentioned that diffusion happens when an innovation is communicated through certain channels over time throughout members of a social system. In reference to the author's study, the innovation is DGBL, which has been *communicated* through professional conferences, professional developments, or through colleagues' experiences. The *length of time* has been since the creation of home computers in 1973 (Smith & Alexander, 1999), and the *social system* is the field of education. Just before the personal computer boom in the late 1970s, one of the first studies about digital gaming occurred in a social studies setting (Hetzner, 1973). This is the earliest description of digital gaming in research. The researcher referred to digital gaming as computer-based simulation at that time, but the premise is the same (i.e., using digital games to educate students).

According to Rogers's (2003) adopter categories, the field of education was still in the innovator, or early adopter phase for using DGBL in the classroom. This was due to what Rogers referred to as incomplete adoption, or "innovations that have not yet reached 100 percent use" (p. 281). This was the case for DGBL with an under 60% adoption rate in grades K-8 (Takeuchi and Vaala 2014). Stieler-Hunt and Jones (2015) mention that, based on Rogers's (2003) theory, adoption of DGBL will continue to be slow until five things happen, which are as follows:

(1) There is an improvement in teachers' perceptions of the relative advantage of

using digital game play in the classroom, (2) the observability of positive results

of using digital game play in the classroom have increased, (3) the use of digital

game play in the classroom is made less complex, as well as (4) easier to trial, and

(5) more teachers value the role digital game play can have in the classroom. (p.

11)

Although these outcomes might be true within the research parameters of the Stieler-Hunt

and Jones's (2015) qualitative study using semistructured interviews of 13 Australian

teachers, a limitation was that the results were not generalizable due to the small sample

size.

A closer look at how Rogers (2003) labeled innovations to indicate their rate of

diffusion is imperative here. The first item one must look at for an innovation is called

relative advantage. This is the idea of how advantageous people perceive an innovation is

compared to the innovations predecessor. When looking at relative advantage Stieler-

Hunt and Jones (2015) discovered, through their research, that teachers in Australia did

not understand the benefits of DGBL, and, therefore, were apprehensive in bringing

DGBL into their classes.

The next item when considering how an innovation will be adopted is

compatibility. Rogers (2003) concluded that compatibility is how an innovation is

perceived to fit into an already existing values system, peoples' past experiences, and the

current needs of the adopters. In reference to compatibility, Stieler-Hunt and Jones (2015)

mentioned that use of DGBL will not increase until teachers can actually see how DGBL positively affects the outcomes in an increasing number of classrooms.

The third item Rogers (2003) used when looking at how quickly an innovation is diffused is called *complexity*. This means how difficult do adopters perceive the innovation is to understand and use. Stieler-Hunt and Jones (2015) mentioned that the use of DGBL in the classroom needs to be less complex in the form of infrastructure, and establishing a clear connection between the curriculum and the digital game.

Next in Rogers (2003) innovation system is *trialability*, or the ability for people to use the innovation on a trial basis. According to Rogers's theory, the concept of *try before you buy* only helps promote the growth of an innovation. This is what Stieler-Hunt and Jones (2015) meant by allowing for easier ways to trial DGBL tools before needing to buy them.

Finally, when testing how well an innovation will be accepted, Rogers (2003) turned to a concept called *observability*. This means how positive the consumers see the results, or outcomes, from the innovation. To this end Rogers mentioned that an innovation that is not easily observed will diffuse more slowly. Stieler-Hunt and Jones (2015) mentioned as their last point that more teachers need to value the role that digital game play can have in the classroom; however, if the first four areas of Rogers's innovation attributes are not being met by DGBL then observing the value of DGBL can be difficult.

Further similar results from a quantitative study by Bourgonjon et al. (2013) mentioned that adoption cannot happen until teachers see the high-quality education

DGBL brings to the classroom through specific examples of quality and effectiveness. In other words, teachers need to see positive examples of DGBL in action before indiscriminately bringing DGBL into their classrooms. As a quantitative study, these results lacked the human response as to why this was the case, and Bourgonjon et al. (2013) mentioned that qualitative studies need to be conducted to further look at specifically why teachers are hesitant to bring DGBL into the classroom.

For the purpose of my study, the DIT framework offered a lens to examine the data from the interviews. In other words, how teachers perceive the factors that influence their adoption or rejection of using DGBL in the classroom could be due to Rogers's (2003) concepts. The interview data can be analyzed using Rogers's framework, but also considering the potential for other factors not identified in the diffusion theory. DIT can also help to interpret where on the adoption spectrum middle school teachers may be and how diffused the use of DGBL is among middle school teachers. Next in the literature review, I will show the background of DGBL and what current issues and studies have taken place in recent years.

Literature Review

My literature review first covers a brief history of games in the classroom. Then, the effects of DGBL on the learners are reviewed. These effects include: (a) student achievement, (b) student collaboration, (c) student motivation, (d) student engagement, and (e) critical and analytical thinking skills. Finally, I examine what is known about teacher perceptions of DGBL in the classroom.

A Brief History of Using Games in the Classroom

Games have been used in the classroom setting for years. Shubik's (1964) game theory placed everyday events where social interaction is key, into a game atmosphere. Shubik gave examples to help explain this theory, such as battle, diplomatic, and poker situations. Ultimately, looking at how all of these situations have three major themes in common: (a) players, individual decision makers; (b) payoffs, the value assigned to the outcomes; and (c) rules, which specify the variables each player controls, information conditions, and all other environmental aspects (p. 11). These ideas have been the basic framework for games for centuries and are still are prevalent it today's games; whether digital, board, card or other type of game.

Fletcher (1971) built on Shubik's (1964) definition of a game by adding three additional areas that all games have. These areas are: (a) conflict of interest among players, (b) each player has a certain capacity to act (resources) and a pattern of preferences among goals, and (c) an information system (p. 430). It is important to note that every game will have variance between all the definition areas. For example, there might be games for only four players, or games with different types of conflict. Fletcher (1971) also looked at how games can be used in the classroom in two ways. The first is what kind of environment the game help create. In other words, are the games promoting collaboration, critical thinking skills, or even conflict. The second concept was what do the games teach, or more specifically, what do the players learn by playing the game. These could be, but not limited to learning math skills, learning how to verbally communicate, or possibly learning about historical events.

DeVries and Edwards (1973) took games in the classroom another step forward by adding that games by themselves cannot teach the students unless there is a reinforcement activity that takes place. This echoes the behaviorist concept of reinforcing the desired behavior to obtain the desired outcome. DeVries and Edwards (1973) mentioned that games already naturally reinforce the desired behavior, but also mentioned that the frequency and immediacy of the reinforcement are key to how much a student will learn.

In the 1980's most of the research on games in the classroom appeared to be reviews of literature about the effectiveness of games in the classroom setting (e.g. Jacobs & Baum, 1987; Shubik, 1989). Then in the 1990's and early 2000's the research shifted again, but to digital games in the classroom setting (Randel et al., 1992; Garris et al., 2002). According to Prensky (2007), DGBL is the utilization of digital games in either video, computer, or app format to help improve student learning and comprehension of curricular concepts. Researchers have found that while players are gaining experience in the game world, digital games offer opportunity to learn by doing (Kirriemuir, 2002). The expectation of a traditional instructional model has waned, as teachers are moving toward other methods of disseminating classroom information. Instead, students are urged to move toward interdependence by questioning ideas, dispositions, and skills within a changing environment, such as a classroom (Spires, Wiebe, Young, Hollebrands, & Lee, 2012). Furthermore, Spires et al. (2012) give learning in a technology filled classroom a new learning ecology, which is; (a) immediate and constant access to information and a global community, (b) intensity, relevance, and

personalization of learning, (c) highly developed teacher capacities, and (d) highly developed student dispositions (p. 234-239). These ideals are essential for DGBL. As a competitive activity focused on clear instructional objectives, DGBL provides students with hard-to-access or sometimes dangerous real-life phenomena in a situated context that integrates students' school experiences with realities outside of the classroom (Webb, Bunch, & Wallace, 2015). While this section has explored the use of games in the classroom and the evolution to DGBL, the next section explores the effects of DGBL on the learner.

Effects of DGBL on the Learner

There are several effects DGBL has on learners in this section. These are: (a) student achievement, (b) student collaboration, (c) student motivation, (d) student engagement, and (e) critical and analytical thinking skills.

Student achievement and DGBL. One of the most frequent themes that appeared throughout DGBL research is achievement. The overwhelming majority of studies showed, in some way, that DGBL helped to improve student achievement, or learning outcomes significantly (Fe & Abras, 2012; Hess & Gunter, 2013; Spires, Rowe, Mott, & Lester, 2011; Virvou, Katsionis, & Manos, 2005). For example, Fe and Abras (2012) showed in their study that DGBL promoted learning for middle school students with special needs from Southwest United States in a pre-algebra setting. Math classroom results seem to follow close to Fe and Abras's (2012) results, especially those in the area of middle school students aged 11-14 years. Researcher's Bai, Pan, Hirumi, and Kebritchi (2012) showed through using DimensionM, a math specific digital game, eighth grade

students' algebra performance improved significantly. Further, Plass et al. (2013) looked at the effect of DGBL in a technology themed after school program, which showed that players' math fluency scores had improved overall from pre to post test. They were quick to mention, however, the result could just as easily have been from outside influences and not the DGBL as they could not always account for where the students were getting extra math help, if not from the digital games.

The results appear to be similar across other settings and subjects as well. Shin, Sutherland, Norris, and Solloway (2012) looked at both a card game and a digital game for helping second grade students with math comprehension and found the digital game players outperformed the card game players on a pre/posttest comparison. In the reading classroom study by McClanahan, Williams, Kennedy, and Tate (2012) DGBL showed positive results for a student with severe ADHD while his teachers reported noticeable progress from when he started the DGBL intervention. The positive results in student achievement carry over to the engineering classroom as well. Su and Cheng's (2013) study resulted in college students' achievement improving from DGBL at a higher rate than those in a traditional face-to-face setting. Hwang and Chen (2017) conducted a study that showed Taiwanese sixth grade students, who used DGBL, performed significantly higher at a posttest in a natural science classroom setting than those in the control group who were taught with a conventional inquiry-based method. These results were similar to results discovered by Yang (2015), whose data showed that academic achievement for eleventh grade students in a vocational high school who used DGBL were statistically significant. This is when compared to those students who were not given DGBL, but just

used technology in general. Furthermore, in a Singapore social studies classroom Chee,

Mehrotra, and Liu (2013) compared the essays of 15-year old students who were split

into one of two groups. The control group learned about government from traditional

methods, whereas the experimental group participated in a digital game called Statecraft

X, and their teachers followed dialogue pedagogy. In this scenario, the experimental

group outperformed the control group in writing summative essays of what they learned

about government and governance.

Achievement results were also found by Kaufman, Suave, and Renaud (2011)

using a game called *Asthma 1, 2, 3, … Breathe!* They reported that the game contributed

to statistically significant gains in achievement from pre- to posttest. Positive student

achievement results from using DGBL were also found in online classroom

environments. Hess and Gunter (2013) discovered that students who were in a serious

game-based online American history course out achieved those in a nongame-based

American history course. Further, Hsiao et al. (2014) found similar results among Taipei-

fifth grade students' use of collaborative DGBL compared to those students who used

individual PCs as an activity platform. The data showed the collaborative DGBL group

scored significantly higher than the control group from pre- to posttest results. Finally, a

game-based study in the area of science conducted by Sung and Hwang (2013) showed

that learning achievement among sixth grade students in southern Taiwan were

significantly better than those of two control groups. The major difference in this study

was the experimental group added collaboration to DGBL compared to the two control

groups who did not collaborate. There will be further discussion about DGBL and collaboration later in the literature review.

There were, however, a few studies that showed achievement did not differ significantly, between DGBL and control groups, although results were equal (e. g. Carr & Bossomaier, 2011; Panoutsopoulos & Sampson, 2012). Differences in findings could perhaps be due to the use of different populations, different subject matter, or possibly due to the actual game or games themselves. Most of these studies revolved around science curriculum. For example, Sadler et al. (2014) found that the game in their study, Mission Biotech, helped students achieve at the same level as those in a non-game background. In this study, professional development (PD) was given to teachers over two different summers in order to properly integrate the control and experimental groups into this study. The issue with this was that the game-based PD was given in the first summer, while the nongame-based PD was given the summer before the study was conducted, therefore, allowing that group to be more up to date. Another science-based DGBL study by Perry and Klopfer (2014), who created their own biology-based game for the study, found that only one area of biology, genetics, was significantly improved compared to the control group. The other three areas of biology covered in this study, evolution, DNA, and ecology, did not show significant differences, but DGBL participants had equal improvement to the control group. Finally, in the area of science, Carr and Bossomaier (2011) showed that DGBL did help juniors and seniors from Australia to convey the necessary knowledge of real activity from pre- to posttest; however, it was along similar

lines to that of the control group, and only significantly higher in two of eight areas studied.

There were other DGBL studies that did not focus on science and showed minimal student achievement improvement compared to a control. One such study is from Panoutsopoulos and Sampson (2012) who studied DGBL and its effect on achievement of middle school students in mathematics. However, their study, in Greece, focused on commercial off the shelf games (a.k.a. COTS), instead of games specifically designed for math objectives as from the Fe and Abras's (2012) study. Furthermore, the students from the COTS study were from all levels of ability and not specifically special needs students. These differences could easily contribute to the differing outcomes. In another study that focused on adult participants Proske, Roscoe, and McNamara (2014) found that German university students enrolled in an English language course who were practicing writing skills achieved at the same level, but not significantly better, than conventional practices. This could be due to the difficulty many English-as-a-Second-Language speakers have with learning English and less to do with the game-based learning system implemented in this study. One study found negative results towards DGBL, where the nongame-based group outperformed the game-based group (Bragg, 2012). However, this study focused on games as the actual tool for learning without any teacher interaction or guidance. This suggests, not that DGBL is ineffective, but rather that DGBL without teacher interaction might be more harmful than traditional methods of teaching. Another area that has been examined in the literature related to DGBL is collaboration and its benefits.

Collaboration and DGBL. Klopfer (2008) mentioned five collaborative learning components that can be used in almost any DGBL format. These five components were: (a) positive interdependence, where group members perceive that they are linked with each other so that one cannot succeed unless everyone succeeds; (b) promotive interaction, where students promote each other's success by helping, assisting, supporting, encouraging, and praising each other's efforts to learn; (c) individual accountability, where each individual student's performance is assessed and results are given back to the group and individual; (d) interpersonal and small-group skills, where students develop the interpersonal and small-group skills required for an individual to function as part of a team; and (e) group processing, where group members discuss how well they are achieving their goals and maintaining effective working relationships (Klopfer, 2008). Even if a teacher is using a single player digital game, students can still meet in groups to discuss what they could do better, how they beat or accomplished a level, or what they learned from the game. This collaboration is a powerful tool in the classroom to help solidify concepts or objectives taught in class through collaboration (Shah & Foster, 2014).

Throughout their research on Play Curricular activity Reflection Discussion (PCaRD) Shah and Foster (2014) established the importance of collaboration to help solidify the information obtained from game play, curricular activities, and reflection. Their instrumental case study looked at twenty-one fifth and sixth grade students from a private school in a Northeastern suburban city. Shah and Foster found that those following their PCaRD model showed statistically significant gains in a systems-thinking

knowledge test. However, it must be pointed out that this study was exploratory in nature and further study about using the PCaRD model are necessary to see if the results can be duplicated.

Shih, Shih, Shih, Su, and Chuang (2012) agreed that collaboration can improve student performance; however, their results showed that different collaboration models, strategies, and even surrounding atmospheres can influence the student's performances. It is important to note that due to the small participant size, four 11-year-old students, that these results are not generalizable for every situation or every student. A similar study's data, which focused on collaboration and student achievement, showed students who collaborated through game play out preformed those students who were involved in more traditional methods of teaching (Pareto et al., 2012). This study looked at math achievement results of third grade students from Sweden, as well as, the student's self-confidence levels. Interestingly, the students self-assessed confidence levels showed a significant increase for those in the game-playing group, while those in the traditional group actually decreased in self-confidence. Although, Pareto et al. (2012) mentioned that this might be due to the game that the game-playing group played was more useful in teaching the subject than just a fun activity.

While these results from the elementary setting are positive, the results from the collaborative aspect of DGBL in the secondary classroom also show positive results overall. Van Eaton, Clark, and Smith (2015) showed that middle school physics students from the U.S. are three times more likely to discuss physics using formal reasoning in an online environment, than in a face-to-face environment. This helps to corroborate the

findings of Shih et al., (2012) in that the different atmospheres may lead to different collaboration structures. With these findings in mind, the classroom atmosphere becomes important for educators who want to get the most out of their classroom DGBL activities.

Magnussen, Hansen, Planke, and Sherson (2014) studied Danish high school students aged 17–20, and found that DGBL and collaboration can be a useful tool in the physics classroom setting. Their data showed that using digital games that support participation in an authentic scientific experience can create a highly motivating experience for students learning physics. However, the results did not consider what affects, if any, this type of environment will have on weaker Physics students. In a study with similar results, Hamalainen, Niil-Rama, Lainema, and Oksanen (2018) studied collaborative three-dimensional learning games for vocational students aged 16-18 from Finland. This mixed methods empirical study resulted in data that showed that scripted game mechanics when coupled with collaboration led to more in-depth knowledge sharing when compared to emergent game mechanics. These results direct us to the idea that shared group process, especially those between educators and game developers, might need to take up a bigger portion of student learning in the classroom atmosphere and could be important in using DGBL.

Hamalainen, and Oksanen (2012) studied the influence of collaborative three-dimensional vocational games; however, their focus was on what influence teachers' real-time orchestration had, if any. Their findings indicated that when a teacher used real-time orchestration the students worked harder to demonstrate knowledge, and less effort was put into off task talk. Therefore, real-time teacher orchestration appeared to have

potential for students to improve their knowledge construction process (Hamalainen & Oksanen, 2012). Interestingly, however, the 20 participants in this study were all male, making results not generalizable to a broader population including females.

Martín-SanJose, Juan, Segui, and Garcia-Garcia (2015) studied the effect of DGBL and collaboration on 100 third and fourth grade students from Spain. They discovered that playing games collaboratively in large groups, or pairs can be a valuable learning method, especially when compared to traditional teaching methodologies. However, this study used collaborative games, and did not look at how DGBL improved upon collaboration, but rather that collaboration when mixed with DGBL can help achieve higher learning outcomes.

While the previous studies focused on school aged children, Hummel et al. (2011), showed how scripted collaboration affected adults in acquiring water management skills. Their case study looked at how twelve water management students from the Netherlands, with an average age of 22, played a scripted digital game called 'Aquaculture' to help learn the information from a university course on water management. The results from the study indicated that scripted collaboration significantly improved the quality of learning. While the results were positive for learning outcomes, students did not care for scripted collaboration compared to real-life collaboration. Therefore, further study could be conducted on scripted collaboration to determine where students find it useful. Furthermore, studies could be conducted to see whether school aged children benefit from scripted collaboration as well as adults.

One final study showed positive outcomes for using collaboration in a DGBL classroom atmosphere although the overall focus was not necessarily on the students. Marty and Carron (2011) observed how important collaboration for student learning was but the focus from their study was on how the teacher could use collaboration in order to make the DGBL collaboration process as effective as possible. This was done through a learning management system (LMS) called the pedagogical dungeon. The pedagogical dungeon was where students met to collaborate on different problems, and through this collaboration, the teacher tracked what the students were discussing, or if they were struggling to "clear" a room. The teacher could easily insert additional activities that focused on specifics that students might be missing to finish the room. The findings suggested that this student interaction, through the game, allowed for the teacher to help strengthen the collaboration process. Ultimately, Marty and Carron concluded that the skills the teacher wanted to improve, through this specific DGBL process, must be identified and set up prior to playing the game in order to measure the true effectiveness of the outcomes.

While the previous studies showed positive outcomes for collaboration and DGBL, there are also those that do not show positive results. For example, Meij, Albers, and Leemkuil (2011) conducted a mixed-methods study of forty-five university students from the Netherlands who played the game *Lemonade Tycoon* either alone, or in a partner setting. Those students who collaborated showed no more improvement on engagement than those who were playing alone, and there was no significant difference in students' knowledge scores. However, this may have been due to the lack of depth of the

conversations in the partner groups. Ultimately, the partner groups were only focusing on the trivial game features, such as move proposals, instead of the reasoning behind why a move would work. A different study by Sanchez and Olivares (2011), which looked at problem solving and collaboration with mobile DGBL, also found no influence on problem solving or collaboration skills. This may have been due to what the researchers say might not have been enough time for the students to learn the skills studied. For example, their study only lasted three months, but the skills being learned, science content skills, might take closer to five to six months, or longer to master.

One final thought on collaboration and DGBL. Of the twelve articles reviewed here, only two studies were conducted with American students, and both of those used middle school students (Shah & Foster, 2014; Van Eaton et al., 2015). Furthermore, many of the sample sizes in the collaboration studies were small and made it quite difficult to generalize the results. Further studies are needed with American students to examine how collaboration and DGBL affect their experiences, and/or learning outcomes. In addition to studies looking at DGBL and collaboration, additional research into the literature on DGBL showed a theme of motivation.

Motivation and DGBL. Another theme that emerged from DGBL research was how, or what influence DGBL has on motivation. Habgood and Ainsworth (2011) conducted a two-factor mixed methods study of 51 elementary school students from northern England about how game design affects motivation and learning outcomes. The data showed that students who played the intrinsic designed digital game out preformed, in a math test, those students who played the extrinsic designed game, and the control

group. In another study of elementary students Filsecker and Hickey (2014) looked at external rewards on motivation in a DGBL atmosphere. They studied 106 elementary students from a suburban Midwestern public school in the United States who were given badges (special stickers) for completing specific tasks they could stick to a paper avatar they created to show progress. Their progress was tracked by placing their avatar on a prominently placed leader board for all students to see. Through this external motivation, badges and recognition, the data showed that students who received personal recognition and those who did not receive personal recognition reported similar levels of motivation while playing the game *Quest Atlantis.* Ultimately, Filsecker and Hickey looked to see if overtly obvious external rewards would have a negative influence on student's motivation, to which they found no data to support a negative influence happened from these rewards.

Similar studies have been conducted looking at middle school students rather than elementary students. One such study from Hsiao, Lin, Chen, and Peng (2018) looked at how student's motivation, among other factors, affected their knowledge acquisition. This qualitative case study looked at 86 seventh-grade students from Taiwan who used math software called Problem-solving Assessment, Diagnosis and Remedial Instruction (PSADRI). PSADRI is a game designed for students to help improve their math knowledge and skills. The data showed that students who were using PSADRI had higher motivation scores than those students from the control group who did not use PSADRI. It is important to note that this difference was not statistically significant, but significant enough for the authors to mention.

Another study, from Chen and Law, (2016) used 254 seventh grade students from the central region of Taiwan during a quasi-experimental study. When looking at the quantitative data of using hard and soft scaffolds for students in a DGBL environment they found that hard and soft scaffolds had a negative influence on student motivation, while having a positive influence on learning performance. This is similar to the findings from above, which mention that students get distracted by playing the game and not focused on the learning. Chen and Law did mention that their study was limited to three types of motivation based on the self-determination theory and other studies should be conducted to look at other affective domains for motivation. Both studies are from Taiwan and further studies could be conducted with middle school students from different countries to see if the results can be duplicated.

When looking at high school level students the results for motivation are similar. For example, Yang (2012) conducted a quasi-experimental study of 44 ninth-grade students enrolled in a Civics and Society course to examine the effectiveness of DGBL and traditional instruction on students' learning motivation. The quantitative data showed students in the DGBL group increased their learning motivation over the course of the semester, whereas, the control group either stayed the same, or lost motivation over the semester. Furthermore, upon taking the post-test the DGBL group's motivation was significantly higher than that of the control group. This study only looked at multi-player collaborative gaming, and future studies should look at the effects of single player games versus multiplayer games on students' learning processes and outcomes.

Zhang, Moore, Gu, Chu, and Gao (2016) looked at how active video games, those

games which require more body movement than just fingers, affect physical education

student's motivation to keep moving. To this end, they found that active video games

have been shown to help students continue in participation due to adding high levels of

intrinsic motivation. Therefore, it is the authors contention that active video games be

used by more physical education professionals as a way to reduce sedentary lifestyles of

so many students.

At the university level, or adult level, results appear to be somewhat mixed for

how DGBL affects motivation. Braghirolli, Ribeiro, Weise, and Pizzolato (2016) studied

219 Brazilian university students and how a web-based game affected their learning

knowledge and motivation. The quantitative data showed the industrial engineering

students were significantly motivated by the game. Furthermore, the students also

reported high levels of enjoyment while playing the game. Woo (2013) found similar

results when researching 63 second-year university students from Taiwan. This

quantitative study used the attention, relevance, confidence, and satisfaction motivation

model (ARCS). The results indicated the digital game stimulated the students' learning

motivation, and the authors recommended digital game designers could increase

motivation in games without overloading cognitive load in order to enhance learning

effectiveness.

Another study, conducted by Proske, Roscoe, and McNamara (2014), also used

the ARCS model to assess the effectiveness of DGBL on motivation and achievement.

The participants ($n = 175$) were German university students enrolled in English courses

to improve their English fluency. The game-based students were compared to three other course types, which were (a) question-based, (b) model-based, and (c) writing-based. In this quantitative study, when compared to question-based practice, game-based practice was perceived as more interesting and engaging. These two courses were set up in the same way with the exception of the game-based course playing the game. This result is a strong indicator of the benefits of gaining students' attention with DGBL. However, students in the model-based and writing-based courses perceived their practice as equally motivating to the game-based approach.

Further research into motivation and DGBL brought to light a couple of studies with negative results towards DGBL improving student motivation. A quasi-experimental study from Nguyen (2015), used 53 students from the School of Business–International School–Vietnam National School in Vietnam. In this quantitative study, a 5-point Likert scale was used to measure the intrinsic motivation pre- and post-test between students in a game-based course, and those in a traditional course. The data results showed that students in the game group had no significant difference in the mean scores for interest when compared to the non-game group. Further, the mean score on competence for the non-game group was better than the game group. This could have occurred for several different reasons. First, the students in both groups had not taken any quantitative courses yet and the simulation required knowledge of quantitative decision-making skills. In the case of the non-game group the ability to ask questions to an expert and get a direct answer may have accounted for the difference in results. Second, quite possibly most important, the game-based group had to play the game on their own time, and the

researcher could not monitor how often, or how long the students accessed or played the game. Studies about the negative effect students perceive from homework show that doing an assignment outside of normal class time can be seen as a negative by students (Bennett & Kalish, 2006; Buell, 2004). To this end, the students may have perceived the assignment to play the game outside of class in a negative way and did not give it as much attention as necessary.

Erhel and Jamet (2013) conducted a study of 46 adult students from a university in France about how DGBL and specific instruction affected their intrinsic motivation. The quantitative data showed no significant results on motivation of the experimental group when compared to the control. This contradicts the findings from other studies, however, Erhel and Jamet (2013) point out that the nature of their study, the type of instruction, was not the same as other studies which looked at motivation in DGBL compared to other forms of learning. In addition to studies looking at DGBL and achievement and DGBL and motivation, the literature review identified studies about engagement and DGBL.

Engagement and DGBL. It is widely known in the field of education that teachers, administrators, and parents want their students engaged in the lesson in order to obtain as much information as possible. Little (2015) looked at how DGBL affected student engagement and achievement of 34 high school aged students from a rural east Texas school. He found that when compared to traditional science labs, DGBL offered the same levels of engagement and achievement according to the teacher reported data.

Similar results appear in other science related classroom studies that show DGBL offers

the same or better experiences for engagement as regular classroom activities.

Flynn and Richert (2018) studied 147 students aged 7-12 years and their

engagement with DGBL and executive functioning (EF). The data showed that the

students who played cognitively engaging video games for 20 minutes out performed

those who were engaged in 20 minutes of exercise, or conversations. These results are

improvements in the most complex EF tasks according to the authors. To this end, the

study suggests that cognitive engagement in video games has a better chance to improve

EF than physical activity.

Perry and Klopfer (2014) took the idea of engagement a step further when they

looked to see what game design characteristics were the best fit for obtaining the highest

student engagement possible. In their study UbiqGames developed UbiqBio which are

science-themed games that focus on science topics. The results from this study of 239

ninth and tenth grade students in the Boston Massachusetts area were quite clear. The

more time spent playing (engagement) and the higher the level the players achieved

positively correlated to success in the class when playing the UbiqBio games.

Another study about games engaging students in science content comes from

Australia. According to Douglas, Salter, and Capstick (2011), first year human life

science students at the University of Tasmania who took a cell biology course and an

anatomy course were introduced to the idea of DGBL in their first semester. Their data

showed a strong connection to DGBL being able to engage students in the science

content. Interestingly, this study mentioned percentages of students several times, but

does not list how many students actually participated in the study. Therefore, the replication of this study would be difficult as this is a large piece of information withheld from the readers. Still, positive results for DGBL and engagement can be found in this study. The above studies all cover the field of science in the education world.

Yet another study showed how influential DGBL can be in the science classroom. Hamari et al. (2016) studied 134 high school students from 11 classrooms across the country who played the game *Quantum Spectre* to see how it influenced their engagement with physics content. In addition, Hamari et al. studied 40 undergrad students who played an engineering game called *Spumone* to see if it also influenced student's engagement in the content. In both studies, engagement was viewed as a large construct of interest, enjoyment, and concentration. What they discovered was that not only is it possible for educational video games to increase student engagement, but that engagement had a positive effect on learning. It is important to note that the games were from the category of games called "educational games." Educational games are games that were designed purposefully to be helpful in learning specific content from areas such as math, science, language arts, etc. (Hamari et al., 2016).

Another study from Schaaf (2012) found similar results. When looking at 280 students from grades three through five from a Maryland public school Schaff (2012) found that DGBL can be as effective in engaging students as other research-proven instructional strategies. It was never made clear what other instructional strategies were used for the control group, which makes duplicating the results quite impossible. Another interesting point from this study was only 0.2% of the participant population qualified for

free and reduced lunch. In comparison, the participants in Perry and Klopfer's (2014) study were all from urban low socioeconomic schools.

DGBL is not only catching on in the world of education, but also in the professional world. For example, Misfeldt (2015) conducted a qualitative study about project management for nine construction workers from Denmark. The findings suggested overall that the game engaged the participants not only in immersion, but emotionally due to the designed competition of the game. Further, the interviews revealed that the students found the experience meaningful as the game used "real world" examples that would normally arise on construction sites. Ultimately, the game, called *Benspaend,* was designed for the purpose of managing a construction site, which according to the participants did a great job at getting the players to immerse themselves in what to do next if a problem came up.

A number of researchers have conducted systematic reviews of the literature on DGBL. Abdul Jabbar and Felicia (2015) investigated game design to see which design features specifically promoted engagement in DGBL environments. Also, reviewing the literature on DGBL were Connolly, Boyle, MacArthur, Hainey, and Boyle (2012), and Girard, Ecalle, and Magnan (2013), however, they looked specifically at serious games as a whole and how they affected different educational domains. Abdul Jabbar and Felicia (2015) focused their review on those studies whose participants were between the ages of 8 and 14 years. They included papers based on three items: (a) if the use of games in the studies were used to acquire knowledge or content understanding, (b) if the games were designed using educational values, and (c) if the games were commercially used or

modified for the purposes of learning. Through these criteria 91 papers were identified as being acceptable for the study. What Abdul Jabbar and Felicia discovered was the concept of engagement was a very broad topic and each paper addressed different aspects of engagement. Ultimately, they found from the review of the literature that three major areas should be considered when designing a game around engagement. Those areas were: (a) the use of multimedia, such as avatars, virtual environments, narrative, and graphics; (b) challenges and conflicts, this could be with other students, or an AI type interface; and (c) control and choices, students want to be given control and choice in their own learning.

As previously mentioned, Connolly et al. (2012), and Girard et al. (2013) also looked at DGBL but under differing criteria. The criteria set up by Connolly et al. (2012) looked at papers whose participants were over the age of 14. On the other hand, Girard et al. (2013) looked at every research paper that was experimental in nature and those which used serious games for training or learning. However, by looking at only those studies about serious games that are experimental in nature the results were very limited, as only 30 studies were found. In the Connolly et al. study 129 papers were included in the review of literature. They found that the number of positive research studies for DGBL significantly outweighed studies that showed a negative result toward DGBL. Further, they discovered very similar results to those of Abdul Jabbar and Felicia (2015) on engagement, which was that engagement is a very broad topic and narrowing it down to one or two items for success is quite difficult. Finally, Girard et al. only reviewed nine studies, but their results showed that more experimental studies needed to be conducted

to see if serious game-based learning is effective. Again, this could be due to the very narrow scope of their study.

The area of engagement studies was overwhelmingly focused on science content leaving the question as to what about other subjects like math, or language arts. The research contained a gap in the area of engagement and other educational content areas, and therefore, should be looked at for further studies. Studies in the literature also examined the link between DGBL and critical thinking and problem solving.

Critical thinking and analytical problem solving and DGBL. A natural segue from engagement and DGBL is to critical thinking and problem solving and DGBL. Lee et al. (2016) conducted a study of 25 undergraduate students from Hanyang University in Korea, which looked at how cooperative DGBL affects critical thinking skills. What they found was in improving critical thinking skills. One of the major limitations of this study was that it was limited to undergrad engineering students from Korea. Therefore, the results may not easily correlate to other subjects and students of varying ages.

In another study of undergraduate students, Halpern et al. (2012) used a computerized learning game called *Operation ARA* (Acquiring Research Acumen) to see how it affected student critical thinking skills. What they found in the quantitative data collected from 136 college aged students from the United States was that students who played *Operation ARA* had higher proportional learning gains compared to those who did not play the game. Critical thinking skills were mentioned throughout the introduction, but there were no data from this study to show how the game affected critical thinking

skills. The authors just mentioned how playing the game could lead to higher level learning gains.

Continuing in the area of adult learning, Gerber and Scott (2011) conducted a quantitative study of 121 gaming and non-gaming adults, via an online survey. What they discovered was that gamers and non-gamers showed similar critical thinking dispositions. However, the data did show gamers who focused more on strategy type games did score significantly higher on the Actively Open-Minded Thinking Scale when compared to the other 10 game genres from this study. Another attention-grabbing concept from this study was when the results of those who played for up to two hours compared to those who played more than two hours. What was found was those who played less than two hours scored higher on the Actively Open-Minded Thinking Scale compared to those who played more than two hours.

Eseryel et al. (2011) took a different route in critical thinking-DGBL research by studying 251 ninth grade students from a rural high school in the Midwest of the United States. In this study students were asked to play *McLarin's Adventures,* which is a massively multiplayer online game, or MMOG. During and after gameplay student's problem-solving skills were analyzed and it was found there were significant changes in complex problem-solving performance for those who played the game. If this result holds true for ninth grade students, following the game design of *McLarin's Adventures* might prove valuable for other content area game designers to follow if critical thinking is a wanted outcome.

Eservel, Law, Ifenthaler, Ge, and Miller (2014) continued to study the effect DGBL had on critical thinking. Once again using ninth grade students from a rural high school in the United States, they studied 88 students who played *McLarin's Adventures* for an entire school year. Eservel et al. (2014) analyzed the data from pre and post-tests and discovered that "motivation and engagement have a crucial effect on students' development of complex problem-solving competencies in DGBL" (p. 50). Interestingly, the data also showed that improvement in critical thinking did not necessarily happen by only playing educational games. There was much more that went into increasing critical thinking skills by using DGBL such as game design, purpose of the game, and how it connects to the curriculum to mention a few important attributes.

In another study of ninth grade students Yang (2012) researched the affect DGBL had on their problem-solving skills. According to the post-hoc analysis, the data showed that post-test scores were significantly higher than both the pre- and mid-test scores for students in the DGBL group. This result helped confirm the development of higher order thinking skills promoted by DGBL over a prolonged period of time. More research needs to be conducted to find out exactly how DGBL is connected to critical thinking and analytical problem solving.

A critical thinking study from DeVane, Durga, and Squire (2010) was a four-year longitudinal study of middle school students in an after-school history-based gaming club. Ultimately, this study only focused on two players and how they thought, acted and felt in relation to the game. The qualitative data showed three major trends. The first trend was instead of logically thinking about the process to solve a problem, the gamers

tried to figure it out immediately. Second, the players could figure out and understand the relationships between different game elements and how those could help them beat the game in an easy manner. Third, the problem solving of the students was highly collaborative in nature, not only helping each other, but also those playing online in different locations around the globe. Ultimately, DeVane, Durga, and Squire mentioned how collaborative learning helped the participants in their critical thinking skills, specifically toward systems thinking. However, they also mentioned how this was a very limited small study and more research needed to be conducted to see if these results could be reproduced on a larger scale. In addition to research on the effect of DGBL on achievement, motivation, and engagement, DGBL design and the flow experience were also examined in the literature.

Teacher Perceptions of Technology and DGBL in the Classroom

When looking at teacher perception of DGBL several studies were found through the literature review process. These can be split into two groups. One group of research looked at preservice teachers while the other group of studies looked at teachers currently in the field at the time of the research.

Preservice teacher perceptions. The first study of preservice teacher's dealings with DGBL for this literature review was conducted by Ray and Coulter (2010), who found that 89% of the participants, preservice middle school teachers from a doctoral granting research university in the intermountain western United States, believed that utilizing digital mini-games had the potential to support meaningful student outcomes. This is however, a small study of preservice teachers in a course setting, and therefore the

participants could have responded in a way they thought would be the most academically acceptable. Interestingly however, only 75% of the respondents agreed that digital mini-games could be used in their own future classrooms and methodologies. What could cause this contradiction of thought?

A similar study, from Schrader, Zheng, and Young (2006) looked at how 198 participants from three different universities viewed massively multi-player online games (MMOGs) in relation to the classroom and obtaining learning outcomes. Their study showed that while preservice teachers were familiar with this type of game, many did not understand how to incorporate such a tool in their classrooms. Schrader, Zheng, and Young also found that many of their participants considered games to be important educational tools. These results were very similar to those in the study by Ray and Coulter (2010).

Another study conducted using U.S. preservice teachers comes from Sardone, and Devlin-Scherer (2009), which looked at how preservice teachers viewed digital learning games as an immersive strategy in their classrooms. The 25 participants were secondary education sophomores enrolled in courses at a mid-sized private university in the northeastern section of the United States. Sardone and Devlin-Scherer found that 96% of the participants were mostly optimistic about the use of digital games in education. However, of the 96%, 30% expressed concern or doubts towards games as the stand-alone methodology for teaching their subject.

The next study about preservice teacher's perceptions came from Turkey. Can and Cagiltay (2006) studied 116 students from Turkish universities in a mixed methods study.

From the 116 students, 16 were selected to be interviewed to obtain further detail about preservice teacher responses. The data showed that while the participants overwhelmingly supported the use of computer games with educational features 83% of the participants planned on using such tools in their future classrooms. This contradicts the findings of the preservice teachers from the United States who were supportive of DGBL, but the majority were unsure of how to incorporate, or if they wanted to bring DGBL into their future classrooms.

In-service teacher perceptions. The next area in teacher perception of DGBL is current classroom teacher perception. Baek (2008) conducted an interesting study in Korea utilizing 444 Korean teachers, which included 256 elementary and 188 secondary teachers. In this quantitative study, the researchers found six factors that would hinder their incorporating DGBL into the classroom. They were: (a) inflexibility of curriculum, (b) negative effects of gaming, (c) student's lack of readiness, (d) lack of supporting materials, (e) fixed class schedules, and (f) limited budgets. Furthermore, the data showed teachers experienced difficulty locating useful educational games to bring into the classroom.

Baek and Choi (2014) later looked at teacher perception on the instructional implications of social network games. They discovered, from 19 qualitative interviews of Korean and American teachers, was that all the participants thought it was highly possible to have social network games used for teaching and learning purposes. There were several reasons for their response, but the most common was the idea that the teachers perceived the social network games would be useful for collaboration.

Zaldívar-Colado, Alvarado-Vázquez, and Rubio-Patrón (2017) studied 12 Mexican teachers' perception of gaming software designed to help improve student's math scores. The software was called Sacar10, and according to the data the teachers believed that Sacar10 was highly influential in enhancing achievement in students. The downside to using DGBL was that students needed considerably more assistance than normal in order to fully understand how to play the game.

Another study of teacher perception of DGBL came from South Africa. Stols and Kriek (2011) looked at 24 different high school teachers, 12 from semi-urban areas and 12 from urban areas, to see what math teachers viewed as the impediments for incorporating DGBL in the geometry classroom. Using the Technology Acceptance Model (TAM) the data showed that perceived usefulness, or the ability to make their lives easier in the classroom, was the greatest predictor to teachers actually using math software. What this may mean is if a teacher does not perceive the game to be helpful then they will not incorporate it into their classroom regardless if others perceive it as useful.

A third study, conducted in Australia, focused on understanding the enthusiasm of teachers who use DGBL in their classrooms. Stieler-Hunt and Jones (2015) conducted 13 in-depth semistructured interviews with teachers who worked in the educational system of Queensland, Australia to discover a theory as to what teachers who incorporate DGBL into their classrooms have in common. What they created was a flowchart for the process of becoming a "believer" and incorporating DGBL into a classroom. Therefore, it would be interesting to see if this theory holds true for teachers in the United States as well. In

fact, that appears to be the biggest gap in the literature review, while other countries have conducted studies on DGBL and teachers' views for why they do or do not incorporate them into their classes, very few have been conducted utilizing current classroom teachers in the United States. It would be interesting to see if those who do not utilize DGBL in the United States would also fit into Stieler-Hunt and Jones's flowchart as well.

Sáez-López, Miller, Vázquez-Cano, and Domínguez-Garrido (2014) explored the attitudes of a mixture of Spanish and American teachers towards utilizing *MinecraftEdu* to help teach the historical perspectives of architecture to middle school students. Overall, the teacher perceptions were positive in nature; however, the lowest score from the questionnaire asked if *MinecraftEdu* took full advantage of class time. This could mean that even if teachers are fine with utilizing DGBL in class, if they see a digital game as a waste of time, the likelihood of its use could be small.

One study found through this literature review that does involve United States classroom teachers does not necessarily use current classroom teachers. Proctor and Marks (2013) used winners of the Milken Educator Award from 1996-2009 to conduct their study on teacher's perception of DGBL. Using the TAM, the authors conducted a survey of 259 exemplar teachers, in which the data showed teacher perception of "usefulness" was the largest determining factor as to whether a teacher would incorporate DGBL. These results appear to hold true with Stols and Kriek (2011) and Stieler-Hunt and Jones's (2015) results.

Yong, Gates, and Harrison (2016) also conducted a study on math teachers' perspectives of DGBL in the classroom. Their phenomenological study used three

teachers from a Malaysian secondary school, all three stated they preferred "chalk-and-talk" as a teaching method over the use of DGBL in the classroom. Results from another study of Malaysian teachers by Noraddin and Kian (2014), showed that the majority of teachers have favorable attitudes to DGBL. Data also showed that gender, age, and years of experience did not influence the participants positive or negative options about DGBL. However, the biggest indicator of a positive attitude towards DGBL was if the teacher played digital games themselves.

Similarly, Marchetti and Valente (2016) also used teachers in their study to discover their attitudes towards learning games and apps; however, these teachers were Danish. Four taught elementary level students while the other three taught secondary level students. Marchetti and Valente's data showed three major attitudes emitted from the teachers. They were: (a) designers of content, those who were inventive with the technologies; (b) mediators, they see themselves between the content and the tools they chose; and (c) IT-concerned, those teachers who feel IT was something they had to learn in addition to their daily functions. This is an interesting study as it has little to do with digital gaming, but a lot more to do with technology, in general, as a tool in the classroom.

Millstone (2012) conducted a quantitative study of 505 Unites States teachers via online survey. The data showed that K-5 teachers used digital games in the classroom two or more days a week 57% of the time compared to 6-8 grade teachers who only used DGBL that often 38% of the time. More recently, Takeuchi and Vaala (2014) concluded that K-5 teachers still used digital games in their classrooms more often than middle

school teachers. However, the numbers have fallen considerably for middle school teachers using digital games in the classroom two or more days a week at just 15% compared to 38% two years earlier.

Millstone's (2012) study also used data which showed what teachers perceived to be the greatest barriers to using DGBL in the classroom. According to the data: (a) cost, (b) lack of technology resources, and (c) emphasis on standardized test scores are the major barriers to incorporating DGBL. However, due to the drop in the percentage of middle school educators using DGBL from 2012 to 2014 there might be other barriers, specific to middle grades, that keep teachers from utilizing DGBL.

Summary and Conclusions

The literature seems to suggest that there may be positive effects as a result of incorporating DGBL into the classrooms. The preponderance of studies suggested positive influence on achievement, motivation and engagement, which are linked to achievement. However, while there are increasing numbers of teachers incorporating gaming in the classroom, the number of middle school teachers utilizing DGBL is shrinking. Further, few of the studies in the literature review examined middle school educators specifically, or the factors that positively or negatively influence middle school teacher choices to use DGBL. Therefore, this study hopes to examine what middle school teachers view as the enablers and impediments to incorporating DGBL in their classrooms and whether their views differ based on length of experience using DGBL through a qualitative approach. Chapter 3 focuses on the methodology used to conduct the research that helped fill this gap.

Chapter 3: Research Method

My purpose in this study was to explore how middle school teachers used DGBL in the classroom and what they perceived as factors influencing their decisions to incorporate DGBL in their classrooms. I also explored potential differences in use and perceptions based on when in their teaching experience they began using DGBL, within their first 3 years, between 4 and 7 years, and 8 or more years after they began teaching. The major sections of this chapter include discussion of the research design and rationale, role of the researcher, methodology, issues with trustworthiness, ethical procedures, and an overall summary of the chapter.

Research Design and Rationale

I focused on the following questions in this study:

RQ1: How do middle school teachers describe their use of DGBL in their classrooms?

RQ2: What factors do middle school teachers view as positively influencing decisions to integrate DGBL into their classrooms?

RQ3: What factors do middle school teachers view as negatively influencing decisions to integrate DGBL into their classrooms?

RQ4: What are the differences in how teachers describe their experiences between those who adopted DGBL within 3 years after they started teaching (innovators), those who adopted DGBL 4 to 7 years after they started teaching, and those who adopted DGBL 8 or more years after they started teaching?

An interview study was better than a site visit or fieldwork for my research. Although observations might help answer how teachers use DGBL in the classroom, they cannot provide insights into their thinking and help to understand the factors that influenced their decisions to use DGBL. My focus in this study was the factors that positively and negatively influence teacher choice to incorporate the use of DGBL in the classroom. Maxwell (2013) mentioned that the nature of what a researcher wants to know will help direct their study. To this end, a need to know the perceptions of teachers, and perceptions that cannot easily be observed, I conducted an interview study. In this study, I conducted semistructured interviews focusing on the how participants used DGBL and their perceptions of factors that influenced them to use DGBL.

The interviews followed an interview protocol similar to the one mentioned by Creswell (2013). I recorded and had the interviews transcribed for analysis. Furthermore, I analyzed the recordings to find similar patterns, or themes, between participants and differences among participants that might be due to experience using DGBL. I used open coding and categorized the data from the qualitative interviews and themes that emerged in the analysis. Maxwell (2013) described this as allowing the important terms the participants use to guide what needs to be coded, and how. This type of coding goes hand-in-hand with creating substantive categories, as these represent the participants' direct words, and how they understand the topic in question. I coded and analyzed the data in accordance with the concepts of Saldaña (2016) and Miles, Huberman, and Saldaña (2014).

A basic qualitative study using interviews took place following an interview protocol. According to Patton (2015), an interview protocol helps ensure that same topics are covered with each interviewee, which leads to a more systematic and comprehensive interview. Rubin and Rubin (2012) also mentioned how interviews are a popular choice among qualitative studies because they help the researchers understand how the participants are directly or indirectly involved with the concept being studied.

A case study did not make sense for my study because the participants, even though they were all teachers in Nebraska, came from different backgrounds and educational experiences. Also, case studies focus on interactions in a context, which was not the focus of this study. Phenomenology was not appropriate because the research was not about deeply understanding the essence or experiences of teachers who use DGBL in the classroom. My focus was rather on more closely examining the factors teachers consider in deciding to incorporate DGBL and differences based on when in their teaching experiences they began using DGBL. Furthermore, a grounded theory study did not make sense for my work because I did not attempt to develop a theory for incorporating DGBL into the classroom. Narrative research typically tells the story of a life experience, chronologically, and within a personal, historical, and social context, identifying the themes of the experience (Creswell, 2007). A narrative study would not have worked for my study, because that type of study usually uses stories about people's life experiences; my research questions addressed general experiences of teachers and the factors that influenced them in deciding to use DGBL. Because I am interested in teachers currently in the field of teaching and their current experiences with incorporating

DGBL in the classroom, a basic qualitative study using interviews was the most appropriate approach for my work.

Role of the Researcher

I conducted the interviews with the participants and asked them to review the transcripts from their individual interviews. As a recent middle school educator in a midwestern state, it was possible that I might have come across a potential interviewee with whom I had worked the past, but this did not happen. Also, I had been a member of the NETA organization for approximately 7 years, which also might have allowed for familiarity with some of those who volunteered to be participants. But, in no instance, did I include participants who I knew or had worked with in some capacity in the past. As a middle school teacher, I did not have administrative roles with any of the participants; consequently, this did not affect the outcome of the data. Ultimately, there were not any power or familial relationships with participants based on my past experiences.

Methodology

In this section, I describe the methods that I used to conduct the research. I cover the participant selection, the instrumentation, and different procedures for collecting the data. Further, in the methodology section, I describe the data analysis for the study.

Participant Selection Logic

The Nebraska Department of Education (2016) stated that educators must have at least 3 years of teaching experience to be considered a master teacher. Therefore, middle school teachers who had at least 3 years of teaching experience would be expected to have a deep enough experience with which to respond to interview questions related to

the research questions of this study. To obtain a sample of those middle school teachers who fit the criteria, I posted an invitation in an issue of the NETA newsletter to let the 3,000 plus readers know about my research and asked middle school teachers with at least 3 years of teaching experience and with at least some experience with DGBL in their classrooms to participate in the study. Merriam and Tisdell (2016) mentioned that sample size is ambiguous and depends on saturation of data. Guest, Bunce, and Johnson (2006) conducted a study to determine how many interviews generally resulted in saturation. Their findings indicated that 97% of codes were identified within 12 interviews and 94% within the first six interviews. To this end, the idea of interviewing eight middle school educators about the factors positively and negatively influencing decisions about using DGBL in the classroom was appropriate, and I believe that I reached saturation of data.

Participants were eight NETA middle school teachers who had incorporated DGBL into their classrooms in some way and who had at least 3 years of teaching experience. In addition to the teachers who fit the criteria and responded to the invitation, I used snowball sampling of NETA members to obtain the eight participants. I emailed the informed consent and asked for contact information for setting up the interview.

Patton (2015) mentioned with saturation sampling, it is important to be aware of four issues that could cause premature saturation. They are (a) the sampling scope is too narrow; (b) the researcher's analytical perspective is limited; (c) the method is not resulting in deep, and rich information; and (d) the researcher is unable to get beyond the surface with participants (p. 301). Sessoms (2016) conducted six face-to-face interviews

with teachers to find their perceptions of computer-based instruction in math for students

with disabilities. Van Bodegraven (2015) examined a small sample size of eight teachers

to discern how, why, and when teachers change their classroom practices. Based on these

smaller sample sized studies, as well as Patton's (2015) suggestions about studies with a

narrow set of experiences that are being studied, I expected that saturation could be met

by interviewing as few as eight middle school teachers.

Instrumentation

Based on the concepts of conducting qualitative research from Merriam and

Tisdell (2016), Patton (2015), and Rubin and Rubin (2012), I formed an interview

protocol (Appendix A). The protocol provided details of how I conducted the face-to face

interview. According to Rubin and Rubin (2012) responsive interviewers should structure

their interviews around three types of questions which are: (a) main questions, (b) probes,

and (c) follow-up questions. Purposively then, I included these types of questions in the

protocol. This protocol helped keep me and the interviewee on the same path as the other

interviews; thus, increasing the ability to obtain reliable data from the interviews.

Grounded on the ideas of Rubin and Rubin (2012) when constructing main interview

questions, I created the questions based on my knowledge and experience with

incorporating DGBL in the classroom and around the factors in the Diffusion of

Innovation theory.

Merriam and Tisdell (2016) mentioned the importance of setting up the structure

of the interview in either highly structured, semi-structured, or unstructured/informal

formats. For the purposes of this study, I conducted semi-structured interviews, which

had some structure, but also allowed for more flexibility depending on how each participant answered the different questions. Patton (2015) focused on ten interview principles or skills to cultivate before and while conducting an interview. These are (a) ask open-ended questions, (b) be clear, (c) listen, (d) probe as appropriate, (e) observe, (f) be both empathetic and neutral, (g) make transitions, (h) distinguish types of questions, (i) be prepared for the unexpected, (j) be present throughout. I employed, all of these concepts in the creation of the interview protocol, and questions or probes. Based on the ideas behind Patton's (2015) qualitative practices I created the interview with questions that were open ended thought-provoking.

Procedures for Recruitment, Participation, and Data Collection

After receiving names, via email from possible participants, I sent an email from to see if the participants still wanted to participate in the study. Once a participant was contacted and I had approval for their participation, I set up a time to interview the participant face-to-face.

The participants were only those who consented to participate in the study, with the understanding they could drop out at any time. Furthermore, these participants were middle school teachers with at least 3 years of experience teaching middle school students and at least some experience using DGBL. It was also made clear that their information was confidential; pseudonyms were given to each participant. Further, the participants were given a copy of the consent form and asked to sign a copy for my files at the time of the interview.

The face-to-face interviews I used to collect the data occurred at a location and time of the interviewees' choosing. The location was somewhere quiet and relatively private. The interviews themselves were recorded using two different recording devices to ensure the capture of the interview, should one fail. One recording device was an iPhone 7 plus and the other was a digital voice recorder. Also, the interviews were transcribed by a transcription service verbatim upon completion. Each interview was approximately an hour in length. The participants were asked the same set of interview questions with probes and follow up questions based on their responses to the initial question.

I personally conducted and recorded the interviews. Then, each interview was then transcribed by a transcribing service and coded by me. During the interviews, I attempted to control facial expressions, tone, and body language, made eye contact with the participants and showed an interest in their responses. I used a normal tone of voice without emphasizing words from the questions. By doing this I hoped to get the participants' true thoughts about the questions and not what they thought the researcher wanted to hear. Leading questions were not asked; and therefore, bias was reduced during the interview process. Participants were informed when the analysis was complete, and were contacted, by email, to let them know the interpretations of the data. In the email, I asked the participants for any additional thoughts they might like to add and whether they found the findings plausible as a member check.

Data Analysis

First, the interviews were transcribed verbatim. Then, I immersed myself in the data by reading and re-reading the transcripts several times prior to beginning the coding process. Miles et al. (2014) mentioned first and second cycle coding to help find emerging themes. To this end, I used first and second cycle coding. Initially, for first cycle coding the I used in vivo coding. Saldaña (2016) determined that in vivo coding is highly useful for nearly all qualitative studies, as well as, studies that want to highlight participants voice. For second cycle coding, I used pattern codes to find categories, or themes from the interviews. According to Saldaña (2016), coding is the responsibility of the researcher, and the data used will come directly from the interviews with the participants. Given the focus of this study to understand factors influencing teacher decisions to use DGBL in the classroom, I used thematic analysis to help discover these factors. According to Merriam and Tisdell (2016) finding themes is an important piece of data analysis.

I began with in vivo coding where data were examined to look for units of meaning (words, sentences, phrases) that appeared important. Codes were created using the actual words of the respondent or created to reflect the underlying concept. Once completed with the initial coding, transcripts were reviewed to see if there were additional units needed coding. Then, I conducted a second cycle of coding called pattern coding to eliminate, subdivide, or combine codes to look for repeating ideas (Miles et al., 2014). Once this coding process was completed, codes were grouped together that had similar meanings to develop categories.

Discrepant data, or data that contradicted the initial categories, were also searched for. According to Miles et al. (2014) contradictions happen in qualitative research and runs counter to the more common themes. Once categories were finalized, I looked for patterns and relationships among the categories and organized them into themes following the instructions from Saldaña (2016), and Miles et al. I also examined patterns across the three groups of teachers who began using DGBL at different points in their teaching career. I then compared the themes with Rogers's DIT.

Issues of Trustworthiness

Lincoln and Guba (1985) mentioned utilizing credibility, transferability, dependability, and confirmability in qualitative studies in order promote validity and reliability. A number of strategies were used to ensure rigor in the study.

Credibility

Credibility addresses the truthfulness of the findings. Data triangulation is one method of enhancing credibility. Collecting data from multiple subjects with differing experiences using DGBL served to help triangulate findings. Member checking was another strategy that I used to enhance credibility by asking participants to provide feedback on the accuracy of the findings. I showed the results of the study to the participants so a review by participants could occur. According to Patton (2015), this is when the participants look at the results to provide feedback about the accuracy, fairness, and completeness of the findings. Also, an expert audit review took place as my committee looked at the results.

Transferability

Transferability refers to the extent to which findings can be applied to other contexts or groups. I created very detailed and thick descriptions. According to Saldaña (2016), by having highly detailed descriptions readers should be able to better see and understand how connections to the results could happen. I also clearly described the limitations and a detailed methodology provided.

Dependability

Dependability, similar to reliability in quantitative studies, looks at consistency of the findings or the extent to which variation can be explained. I kept an audit trail allowing for third party review. Also, I employed code-recode strategy where I first coded the data, then left it alone for a period of time, and then re-coded the data and looked at whether the second set of codes was consistent with the first, adjusting as needed where there were differences.

Confirmability

Confirmability is the extent to which the research is free of bias. I understand how the way I act or react to responses from the interviewee affects them and vise-versa. Patton (2015) called this reflexivity. That is, being able to systematically reflect on the study overall. A reflexive journal was kept. Also, as noted previously, I looked for negative or discrepant data.

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Ethical Procedures

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I sent a letter of cooperation to obtain permission from NETA to ask their members to participant in my study. Upon Walden University IRB approval (10-12-17-

0407301) I began the process of contacting potential participants from NETA. I gave

every participant a signed confidentiality statement, which showed how committed I was

to keep the participants information confidential. Furthermore, I gave the participants a

copy of their signed consent form. I clearly told participants they were voluntary

participants and could leave the study any time they chose, with no repercussion from the

researcher or any other entity.

I protected the data by password protection and I gave participants pseudonyms to

protect their identities. I was the only person to know the actual participants names, as

any time I discussed the data with the dissertation committee it was through the use of

pseudonyms. The data will be kept by for at least five years, due to Walden University

regulations, and will be destroyed at the end of that time. There were no conflicts of

interest or any power differentials. I used incentives to thank the participants for their

time. As a thank you for their participation, I gave all participants a $25 gift card to

Amazon at the time of the interview.

Summary

Chapter 3 included the research design and methodology for a research study to

answer the research questions related to middle school teachers' use and perceptions of

DGBL. Steps taken in regard to trustworthiness were detailed. Finally, I discussed the

steps taken to ensure ethical practices were followed. Chapter 4 presents the results from

the study.

Chapter 4: Results

My intent in this study was to better understand how middle school teachers used DGBL in the classroom and what they perceived as factors influencing their decisions to incorporate DGBL in their classrooms. I also explored potential differences in use and perceptions based on when in their teaching careers the teacher began using DGBL. I compared three groups of teachers: (a) those who began using DGBL within their first 3 years of teaching, (b) those who began using DGBL 4 to 7 years after they began teaching, and (c) those who began using DGBL 8 or more years after they began teaching. The major sections of this chapter include a description of the participants and how I collected and analyzed data. I also include the results of the interviews, issues with trustworthiness, ethical procedures, and an overall summary of the chapter.

Research Questions

I focused on the following questions in this study:

RQ1: How do middle school teachers describe their use of DGBL in their classrooms?

RQ2: What factors do middle school teachers view as positively influencing decisions to integrate DGBL into their classrooms?

RQ3: What factors do middle school teachers view as negatively influencing decisions to integrate DGBL into their classrooms?

RQ4: What are the differences in how teachers describe their experiences between those who adopted DGBL within 3 years after they started teaching (innovators), those

who adopted DGBL 4 to 7 years after they started teaching, and those who adopted DGBL 8 or more years after they started teaching?

Setting

My study's setting included participants from multiple rural schools across the state of Nebraska. As a state, 54.92% of Nebraska teachers have a master's degree and average slightly more than 14 years of teaching experience. Nebraska teachers are primarily white, representing 94.9% of all teachers in the state. The largest group represented after the white population are the Hispanic population at 2.9% and then the Black, or African American population at 1.05%. American Native, Asian, Native Hawaiian, Other Pacific Islander, or two or more races are each represented by a half of a percent or less of the current population of teachers in the state of Nebraska.

NETA is a group composed of more than 5,000 educators from the state of Nebraska and a minimal number of members from other local school districts in Iowa and Missouri. The entire teacher population in Nebraska is slightly more than 23,000 teachers; therefore, slightly fewer than one fifth of the teacher population in the state are members of NETA. The demographics of NETA members are similar in characteristics to those of the state. The NETA organization's vision is that the Nebraska educational process will promote use of appropriate technology to support quality teaching and learning. NETA exists for the purpose of providing leadership and promoting the application of technology to the educational process. Its span of interest includes all levels and aspects of education. I used the organization NETA through which I sought volunteers for this study.

Demographics

The participants were all teachers from rural schools in the state of Nebraska. In total, my study had eight participants. The original plan of obtaining all eight participants from the NETA did not go as planned, because only two participants responded to the NETA newsletter article that I used to recruit participants. After 1 month had passed and I found no other participants, I focused on snowball sampling from the two NETA members who had agreed to participate. At the conclusion of their interviews, I asked Participants 1 and 2 whether they knew of other middle school teachers who fit the criteria of the study, and who might be interested in participating in the study. Two more participants responded to the study via this method. From each of these two participants, at least one additional willing participant for the study volunteered. This brought the total number of participants to nine. Unfortunately, one participant dropped from the study by no longer responding to emails. Thus, the final sample consisted of eight teachers.

Of the eight participants, seven had 3 or more years of experience with DGBL, while one participant had less than three years of experience with DGBL. The average years of experience using DGBL was slightly less than 6 (Mean = 5.88 years). Among the participants, there were five females and three males. Teaching experience ranged from 21 years to 5 years at the middle school. The subjects taught by the participants covered the areas of technology, social studies, special education, science, and English language arts. I report characteristics of the respondents in Table 1. I have used pseudonyms.

Table 1

Participant Demographics

	Pseudonym	Gender	Years of teaching	Years of DGBL use	Began using DGBL group
Participant 1	Sally	F	21	6	8+ years
Participant 2	John	M	14	5	8+ years
Participant 3	Coby	M	12	2	8+ years
Participant 4	Zora	F	15	8	4-7 years
Participant 5	Brandy	F	10	6	4-7 years
Participant 6	Alice	F	14	8	4-7 years
Participant 7	Alexa	F	7	7	< 3 years
Participant 8	Jones	M	5	5	< 3 years

Note. DGBL, digital game-based learning.

Data Collection

I recorded the interviews for this study with an iPhone 7 plus, as well as another digital voice recorder in case the iPhone did not record properly. I then had the interviews transcribed from the recordings, verbatim, by a transcriptionist service. Each interview varied in length with the longest being 46 minutes. I asked the participants the same set of interview questions with probes and follow-up questions based on their responses to the initial question. No follow-up interviews were necessary. I emailed the interviewees a copy of the interview transcript to check for accuracy, which they all did and found no issues.

The interview locations and times varied based upon availability and personal preference. To this end, I conducted all interviews face-to-face in different school sites at which each participant worked. All participants agreed they met the criteria for the study and their consent was given to participate in the study. During each interview, I informed

the participants that they would receive a copy of the official transcript of the interview to check for accuracy. Once each of the interviews were complete, I sent the recordings to a transcriptionist, who, before I recorded the interview sessions, signed a transcriptionist confidentiality agreement. Upon obtaining each of the fully transcribed interviews, I sent a copy of each participant's interview transcript to that particular participant to check for accuracy. Each participant stated their approval of the transcripts with no changes or additions necessary. It was at this point, I began hand-coding the transcripts using in vivo coding as described by Saldaña (2016).

Data Analysis

I collected and analyzed the data simultaneously using first and second cycle coding as suggested by Miles et al. (2014). Initially, I used in vivo coding as my first cycle coding strategy, whereas I used the strategy of pattern coding to find categories or themes in conjunction with the first cycle codes. In addition to the in vivo and pattern coding, I used a code and recode strategy to enhance the dependability of my results. I outline my data analysis strategy in this section.

Based on my research questions, I was able to easily identify numerous codes. While listening to the verbal recording of the interviews and simultaneously following the transcript, I coded each transcript. As this process continued throughout the multiple transcripts, I began to highlight similar responses from one transcript to the next that appeared to be repetitive, or similar, in nature.

I then took the transcripts and began to use in vivo coding. I completed this through a process of finding words or phrases that came straight from the interviewees'

language. I selected the words or phrases that caught my attention based on the research

questions and the participants answers to the interview questions. After I completed in

vivo coding, I conducted second cycle coding to eliminate, subdivide, or combine codes

to look for repeating ideas (Miles et al., 2014). Once I completed the pattern coding

process, I grouped the codes together that had similar meanings to develop categories.

From there, I paired the categories, where necessary, to form the overall themes. The

codes, categories, and themes are presented in the coding schema (Appendix B). The

themes that surfaced from the data allowed the research questions to be answered. I

conducted this analysis based on each of the four research questions for this study. A

visual representation of the themes that emerged from the data for each question

regarding middle school teachers' perceptions and use of DGBL can be seen in Figure 1.

Research Question 1: How DGBL Used	• To engage students in content/real world experiences • To support creativity and skill building • To promote teamwork/communication skills • To individualize learning • For feedback/assessment • For classroom management/to fill time

Research Question 2: Positive Influences	• Their positive experiences with digital games • The perception of easier lesson planning and classroom management • The perception of positive influence on students (engagement, confidence, thinking, behavior)

Research Question 3: Negative Influences	• Technical difficulties • Lack of self-efficacy • Perception of more difficult classroom management • The need for flexibility/a backup plan • Time constraints

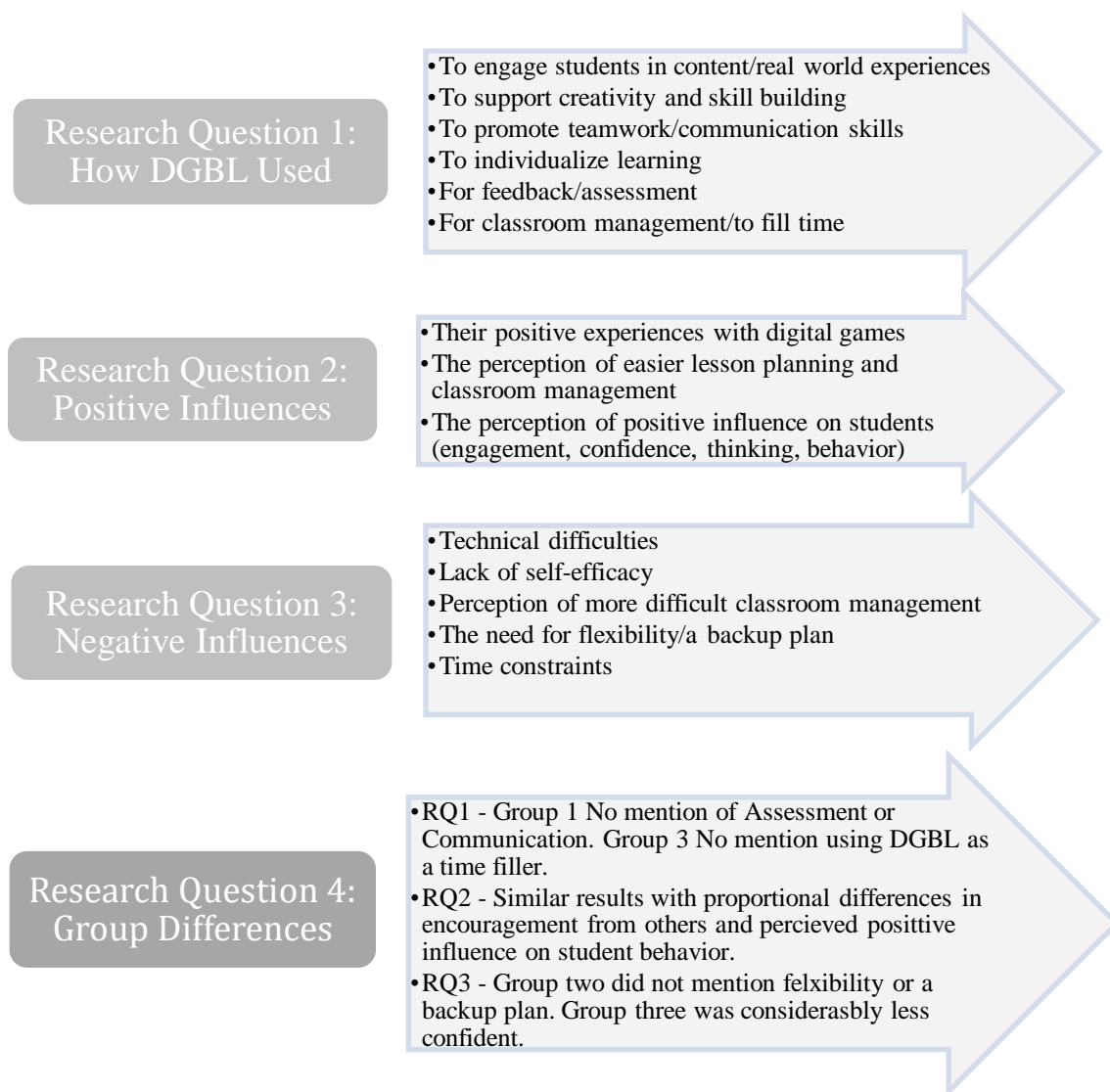| Research Question 4: Group Differences	• RQ1 - Group 1 No mention of Assessment or Communication. Group 3 No mention using DGBL as a time filler. • RQ2 - Similar results with proportional differences in encouragement from others and percieved posittive influence on student behavior. • RQ3 - Group two did not mention felxibility or a backup plan. Group three was considerasbly less confident.

Figure 1. Research questions and themes.

Issues of Trustworthiness

Lincoln and Guba (1985) mentioned utilizing credibility, transferability,

dependability, and confirmability in qualitative studies in order promote validity and

reliability. I used a number of strategies to ensure rigor in the study.

Credibility

Credibility addresses the truthfulness of the findings. Data triangulation is one method of enhancing credibility. Collecting data from multiple subjects with differing experiences using DGBL served to help triangulate findings. Member checking was another strategy that I used to enhance credibility by asking participants to provide feedback on the accuracy of the findings. I showed the results of the study to the participants so a review by participants could occur. According to Patton (2015), this is when the participants look at the results in order to provide feedback about the accuracy, fairness, and completeness of the findings. Participants who reviewed the findings concurred. Also, an expert audit review took place as my committee looked at the results.

Transferability

Transferability refers to the extent to which findings can be applied to other contexts or groups. I created very detailed and thick descriptions. According to Saldaña (2016), by having highly detailed descriptions readers should be able to better see and understand how connections to the results could happen. I clearly described limitations of the study and provided a detailed methodology.

Dependability

Dependability, similar to reliability in quantitative studies, looks at consistency of the findings or the extent to which variation can be explained. I kept an audit trail allowing for third party review. Also, I employed a code-recode strategy where I first coded the data, then left it alone for a period of time, and then re-coded the data and

looked at whether the second set of codes was consistent with the first, adjusting as needed where there were differences.

Confirmability

Confirmability is the extent to which the research is free of bias. Patton (2015) called this reflexivity; that is, being able to systematically reflect on the study overall. I kept a reflexive journal throughout and looked for negative or discrepant data as a check on any bias.

<div align="center">

Results

</div>

An interview protocol was designed and organized around four research questions. The results are presented next by research question.

RQ 1: Use of DGBL in the Classroom

Several categories were discovered through the coding of the data, which led to the themes of the study. Through the use of several interview questions, participants shared their experiences in how they use DGBL in the classroom. Six themes emerged from the data that helped answer the research question about how teachers use DGBL:

1. To engage students in content and real-world experiences.

2. To support creativity and skill building.

3. To promote teamwork/communication skills.

4. To individualize learning.

5. For feedback and assessment.

6. For classroom management.

Theme 1: Engaging students in content and real-world experiences.

Participants discussed the many ways they used games to teach content. Categories that led to this theme included: reaching different students, making content real, and content specific games. Participants shared that utilizing DGBL meant many different types of games could be used in order to engage students in the content in different ways. Jones mentioned that many of the games that are used have both an app or web-based option. Jones stated:

> A little bit of both. I would say a lot of them early had been web-based that have been adapted to an app, but a little, I would say a mix of all of them. I think most commonly though would probably be web-based games, I mean a lot of them are kind of hybrids now, it seems to me.

The participants mentioned several ideas centered around being able to make content more realistic, and to make sure that the students were getting the content necessary.

First, several teachers discussed how students may be turned off to learning the content because of the way it is taught and digital games may re-engage them. As one participant noted:

> They, digital games, also reach a certain audience that maybe doesn't like to do lab, doesn't like to read, doesn't like to sit and listen when we do take notes.

This idea of reaching different types of students was mentioned by multiple participants. Zora, for example, mentioned:

> If you have a text book and they are learning it that way, they are learning from a lecture, it's nice for them to also get that same material and content just in a

different format and I think a lot of times for kids that clicks better than what publishing companies are giving us to use in the classroom. So and it fits different personalities, which I think is good too, and I notice different kids shine and so that's nice too for self-esteem because I think if I—for example just did Kahoot! all the time, it would be the same top three winners every week and so that gives different kids a chance to be on the leaderboard and see their name in lights and things like that.

Jones echoed these thoughts in his interview when he mentioned:

It's a different tool than direct instruction or other forms of instruction so I like that it it's a change of pace. I definitely like the energy in the classroom and I like when it reaches, I would say when it reaches a population of students that maybe haven't been reached before.

Second, teachers discussed how using digital games could help make the content more real for students and thus better engage them in learning. Coby said that he liked the connection to make the student's experience more real. He declared:

I think just the idea that the realistic feel of, okay, so what was that like 2,500 years ago, kind of putting if it took you three days to build it, think about how long it would take them to – in their real life, in the real culture without the technology to build it? So just maybe – maybe give them that realistic feeling too.

Another participant, Jones, also made this connection to his classroom during his interview. Jones revealed:

I actually had kids just get into the web-based version of the old classic Oregon

Trail, yeah, so even some of those kinds of classic games and that's an example, it

would be a perfect example of a role play game that has real historical value and

asks real challenging questions.

Another real-world experience some participants wanted to give students was the ability

to create in a digital game environment. Sally mentioned, "They're building, creating and

then having others try it."

Coby talked about how the games helped teach content by giving students real-

life scenarios:

The role play now would be the way we use it for sure than being able to take a

role as an Egyptian or as a Greek or as a Roman and actually maybe I guess we

focus on the social pyramid. So now we give them a person in society that they

are in, now build with what their life would be like. And then create those

challenges or within this farming here is a challenge that you as a farmer have to

do. And as a military official here is the challenge that you now have to complete.

Coby also said that he liked the connection to make the student's experience more real.

He declared:

I think just the idea that the realistic feel of, okay, so what was that like 2,500

years ago, kind of putting if it took you three days to build it, think about how

long it would take them to – in their real life, in the real culture without the

technology to build it? So just maybe – maybe give them that realistic feeling too.

Third, participants described different games that could be used to teach specific content. The types of games used differed greatly depending on the content area. The participants mentioned several Digital games by name. A list of these digital games can be found in appendix B. When asked what specific content area the digital games were used for, all participants gave specific examples of games that helped them in their content area. For example, Zora, who teaches ELA said:

It's mostly vocabulary and so literary elements, figurative language and like you said parts of speech, I would say the most grammar and language when I've used them the most.

Games for specific science content were also mentioned by Brandy. She stated:

A lot of physics. Because there are tons of simulations, there are a lot of games where you have to figure out what like a roller coaster needs to do in order to be successful and not kill all the participants in the roller coaster. For the chemistry ones it's usually games that deal with the periodic table or chemical equations.

Another science teacher, Alice, mentioned her content as well. She stated:

Science content so, we have – I teach physical science, life science and earth science throughout the year. I have a game for every unit that I teach.

For social studies content the concepts ranged from ancient world history to more modern American history. John mentioned:

We do a bunch with the Ancient Greeks and the Olympics. We entirely turn that unit into a competition where now that I have my Classcraft groups, those groups

will take on one the rural city states and Sparta or Athens or whichever ones it is.

And then we'll actually participate in the games.

Coby stated:

History obviously allows you to do a lot of different things and then that's kind of

the fun part. But the course that I teach uses ancient civilizations, so we – we

focus on Egypt, Greece, Rome and the Middle Ages are kind of the four that we

use.

Continuing with social studies content, Jones stated:

I would say we do it for kind of big events like, you know, Oregon Trail or

American Revolution or Civil War. Those are my content areas where I really,

where those are available. Now, it would be ideal to use them and I try to and, the

things that nobody wants to talk about like, kids have a hard time getting into the

railroad or, you know, kids have a hard time getting into the Monroe Doctrine.

Another content area that was discussed by the participants was math. During her

interview Alexa said:

I would say probably basic facts including integers or non-integers. Fractions is a

tough one for my clientele. But order of operations and that kind of thing is --

because if we're working on order of operations and math facts, then it makes it

easier.

Theme 2: To support creativity and skill building. The second theme emerging

from the data to help answer research question 1 was to support creativity and skill

building. Two categories were included in this theme. These categories are: support of

creativity and support of skill building. When discussing support of creativity, the participants gave numerous answers about building and creating content. For example, Sally mentioned:

> We spent about two weeks on Minecraft EDU. And in that, the seventh graders do Minecraft mazes and I show them some videos and then they create their own mazes and then they play or go through each other's mazes. And then the eighth graders, I see the eighth graders twice in a year. And so their first time through with me, they create Minecraft roller coasters.

Coby mentioned this about supporting creativity:

> We try to also allow them in some way, shape, or form to create their own screen name each time and try to give them a little bit more, I guess, ownership in the actual game that they're doing, and we try to keep it towards something academic. It doesn't have to necessarily be in my classroom. Just as an example, the one that we played the other day, their screen name had to be something about their decade project that we're doing in language arts.

Coby also declared:

> The role play now would be the way we use it for sure than being able to take a role as an Egyptian or as a Greek or as a Roman and actually maybe I guess we focus on the social pyramid. So now we give them a person in society that they are in, now build with what their life would be like. And then create those challenges or within this farming here is a challenge that you as a farmer have to do. And as a military official here is the challenge that you now have to complete.

The second category, which is support of skill building, is that students are given targeted games that challenge the students to ponder thought provoking questions. For example, Alice stated:

When we do silent mode little higher high stakes cuz then they don't have somebody helping him out, so they get to practice first and then they get the chance to see if they actually know it and test their skills.

Brandy also had thoughts about building skills. She expressed:

Finding something new I want to try out. Things that I used in the past knowing that the students get a lot of information or they get a lot of repetition from the games. They also get maybe a deeper understanding. So it's games that are going to either deepen their understanding, and cause them to ask questions.

John went as far to say the following about skill building:

I've also gone away from doing traditional tests this year now that we're more project-based learning and giving students the opportunity to choose the path they are going down and how they're going to show mastery of a concept.

Alexa also mentioned how DGBL can help with supporting skill building. Alexa stated:

They are struggling with, just like going back and doing the simple facts and the simple remembering how to like multiply decimals or order operations. And so a lot of it's drill and skill in my room, just trying to get them. So if they can master those, then get better on grade level skills.

Theme 3: To promote teamwork and communication skills. In general, the third theme, to promote teamwork and communication skills, is about getting the middle

school students to learn how to work with and collaborate with other students. Two major categories appeared from the codes. The categories are a) promotes teamwork, and b) promotes communication skills. Many of the participants discussed how DGBL helped accomplish these skills. Zora mentioned:

> The Quizlet Live one, I kind of like just because kids are talking with each other while they're doing it and they are in it, so it gives another extra advantage to some teamwork skills and some good positive communication skills, and they really do help each other and they just learn good manners too.

Alexa stated:

> I've had some kids go I found this game over the weekend, can we play it in class. And so sometimes we'll even play it. We'll try something as a whole group. Hey, that's awesome that you found something, let's try it see if it works or let me try it. And sometimes it works great, sometimes it doesn't, but it's also nice that the kids are trying to -- they take notice of their learning outside of the opportunity when they don't even have to.

Alice also declared:

> Well they prefer Quizlet Live, so, on Quizlet Live days, they login, they get on and it mixes them up into small groups which they like to get up and talk. And then they have to answer the 12 questions and then we shuffle again and they get a new group and they go on and one of my classes has some pretty smart kids in, so the object of that game is to beat the smart kids or to be on their team hopefully, so that they don't have to beat them, make it win but – and then we'll

play a silent versions where I get like four or five rounds with the team and then

we'll sit down and they have to play again. They're still in their teams but they

can't talk so, they get that exposure to maybe the terminology or the questions of

the vocab whatever it might be and they can learn it in a group environment, so

it's a little less high stakes.

Coby mentioned one of the reasons he likes to use teamwork.

When we go to Minecraft, I try to partner up again at tables where they have

different people from the social pyramid there. If I would put all farmers together,

the first person that does the challenge and gets it would probably share all the

answers. So, I try to split them up to maybe have a military official, may be a

slave, maybe a craft worker and a farmer at a table.

Another category from this section is promoting communication skills. The

majority of the participants mentioned how DGBL is beneficial for collaboration. For

example, John stated:

It requires them to collaborate with their peers in order to continue to level up. So,

a lot of their powers are helping others and they can get bonus points based on

that. So yeah, I rely on it for the collaboration aspect of it.

Zora mentioned the following about one of the DGBL tools she uses. Zora said:

Quizlet Live one, I kind of like just because kids are talking with each other while

they're doing it and they are in it, so it gives another extra advantage to some

teamwork skills and some good positive communication skills, and they really do

help each other and they just learn good manners too and how to be kind of polite to each other

Jones stated:

> I allow students to share when they're doing their role-playing games in most circumstances. So it's my philosophy that it's a social studies class so I expect students to be social, but also control the volume level because we do have classrooms on either side of us.

Theme 4: To individualize learning. A fourth theme that emerged from the data of the first research question was that DGBL was used to individualize learning. One category appeared for this theme, which was promotes individualization. Several of the participants mentioned how it was important for DGBL to be individualized so that each student could work at their own pace, or skill level. For example, Sally declared:

> On coding, most of the time they're working independently. They each have their own laptop or they have their own iPad that they are creating whatever in whatever program they're in. The seventh graders always start out with code.org and work through the lessons. We do the hour of code with the kids.

Alexa also mentioned how she liked the individual aspect of DGBL by sharing:

> I kind of plug in towards certain games that you work on like this website with this game or in this website with this game to work on their individual skills on top of the curriculum that week, the topic for that week. And so a lot of it's really individual based and changes on a regular basis on what games they get on

because it all depends on what fits their learning deficits and then also the topic

for that week.

Zora also indicated why she enjoys the individual aspect of DGBL she stated:

I can still know who is struggling on an individual basis it's probably like that. I

think it's more informative for teachers. And I just think it's a nice another way to

kind of mix it up and keep things fresh and kids need a lot of sparkle to keep them

engaged and interested.

For example, John mentioned:

That's where, you know, they like Kahoot! A lot of them like Quizizz better

because it's there in front of them, it's up on the screen, they can go with their

own pace and not waiting for me to advance a question. So, some of it is student-

driven as well once it's introduced to them.

Alice also mentioned the use of DGBL for individual homework use after a study guide.

She declared:

After we get done checking through the study guide and having a class guided

review, then the remaining class time would be for individual gaming if they do

and individual type game through like Quizizz, or even Quizlet Live as

homework.

Theme 5: For feedback and assessment. This theme is about how the

participants used DGBL for student feedback before, during, or after a lesson. In other

words, the participants discussed how DGBL helps them know what students

comprehended from a lesson and what they did not. Participants also viewed DGBL as an

assessment tool, whether formative or summative. The two categories that emerged from this theme's data were for feedback and assessment. Alexa stated that the district purchased software for the students to be able to play games that help strengthen their weak areas. She revealed:

> Another thing that the district has purchased, it's called MAP skills, it's through NWEA. And through that they identify individual skills that the kids are lacking and need more practice in. And then they provide different links to different gaming sites that you can assign to the kids that they can go work on those individual skills, which is nice.

Alice had multiple comments about feedback from games. Alice stated:

> Just the ability to see that instant feedback on the teacher side of what questions are missing a lot of and knowing what I need to address, re-teach, clarify. You know that immediate feedback I think is huge because then they can if they have a wrong answer then they will see no, you selected this it should be this.

Alice also mentioned that she uses games at times due to the student's ability to review before a test. She revealed:

> They are just, yeah like, review for test kind of so, they see a question that might be similar to the test question so, I'll use the test to make the reviews. So that they can see kind of what to expect on the test and they get that immediate feedback of how they're doing because the day before if they're not doing so good then hopefully, they use that feedback to study a little bit more at home hopefully.

John made comments about how his class will use games for feedback of content that was previously discussed. John expressed:

> Oftentimes if we need to gather back together once we've learned some information, then we'll go and we'll do Kahoot! We'll do Quizizz, things like that, to make sure we're on the same page. Fridays, we set aside time to focus on what's going on in the world, current events or do CNN 10.

Assessment is the next category for the theme for feedback/assessment. Jones discussed how this looked in his classroom. Jones stated:

> So Quizlet Live, going around to see, to hear students answering questions and I'm trying to assess, you know, which students are taking the leadership role in those games, which ones are more active, which ones aren't, which ones are getting those answers and which ones aren't. So, I'm doing a little bit of assessment.

Brandy echoed these thoughts in her interview by stating, "Pre-tests, reviews and usually as a tool to review knowledge. Not usually to introduce anything new, just to review." Zora also revealed that she uses games as a formative assessment tool as well. She said:

> A lot of times, it's for review purposes or test-prep or re-teaching for the most part. But then there's also times where I've used it for check for learning because a lot of the online games now have a great summarization tool at the end where they kind of break it down for you initially, which concepts kids struggled with the most and which ones they seem to have mastered.

Coby also mentioned using DGBL as an assessment tool. Coby expressed the following:

Kahoot! is more of the – a quick review something that they can build at the end

as an assessment. They are both – they are both assessments to me, but I think that

the – the Minecraft is something where we have to probably teach him a little bit

more and give them maybe 3 or 4 or 5 sections of information because it's a little

bit more about culture and about the person and maybe some of the rules and laws

about a society and how it works, versus a Kahoot!, it's kind of a quick formative

versus summative assessments

Theme 6: For classroom management and to fill time. There are two categories

that appeared for this theme; classroom management and timer filler. In the category of

classroom management numerous participants said it had a positive effect. For example,

John said:

I think it's revitalized the way I have taught my class and I don't think it's a sole

reason that I have such a positive rapport with my kids and I have very few

discipline issues. And a big part of that is on the students but, you know, it's

helped me be one of the cool classes.

Coby also mentioned how DGBL can help manage the classroom environment. Coby

declared:

Time on task is something that you can do with Minecraft, but you can kind of

survey the whole land and it's amazing that you can – you can block somebody.

You can teleport them to you and then they're like whoa, whoa, whoa where am I.

Well, you weren't where you were supposed to be. So, simple things like that –

that makes it holds them accountable, but yet the gaming part of it gives you an

opportunity to manipulate it at like you want to or control some of the classroom

environment too.

Sally also mentioned that classroom management was one of the biggest advantages of

DGBL compared to other teaching approaches. Sally expressed:

Its classroom management. It's so much easier to manage when they are looking

forward to what we're doing, and anxious to do what we're doing. Asking when

can we start, and when can we do and are disappointed when something is

finished then because they enjoyed it? That, I guess, that's my biggest thing.

In the next category several of the participants mentioned how they used DGBL

as a time filler. For example, Zora mentioned how at least one of her games can be used

as a meaningful time filler. Zora stated:

I've also used it, for example when something was going faster than I thought it

was and we had 15 minutes left, and you know, but it's like how can we still have

a meaningful lesson and so there's times where I've done that. And so what I liked

about Kahoot! is -- I'm thinking of my lesson for tomorrow, like you know what, I

really think there's a possibility. I needed something at 10 minutes, something in

their transition, but I just don't want to be filtered, I don't want to be busy work,

what could I do? Maybe we need to review action verbs or linking verbs again or

something like that they're not getting.

Alice also mentioned the use of games as a time filler. She said:

When we do Quizizz it's maybe in the interim time of somebody finishing like at

the end of the study guide. Maybe it's a work time, so when they finish early they

can go on Quizizz and it's more self-paced and self-guided not teacher driven, they kind of go at their own speed.

This filling of time extends into other classrooms as well. For example, Alexa revealed:

The teachers in the school know that this is the way that I run my classroom and so they know that the kids always have something they can go and do. So if they have an extra five minutes in class, we will go on and get on whatever your teacher just -- like they're working on a math class and they get that extra practice.

RQ 2: Positive Influences from DGBL

All participants shared how the positive influencers helped them utilize DGBL in their classrooms. These responses lead to several categories, which then lead to three over all themes for this question, which are:

1. Their positive experiences with digital games

2. The perception of easier lesson planning and classroom management

3. The perception of positive effect on students (engagement, confidence, thinking, behavior).

Participants described the numerous positive influencers from easier preparation, to changes in classroom environment to changes in student behavior. The following excerpts emphasize the themes that emerged from the participants responses to answer the second research question.

Theme 1: Their positive experiences with digital games. There were two different categories that emerged from the data to make up this theme: the teacher experience with games before showing the students and encouragement from others. Both of these

categories, according to the participants, lead to positive experiences in and outside the classroom. The first category about the teacher experience before showing the students looks at how the participants experimented with the games before using the game in their DGBL environment. The first way teachers had positive experiences with digital games is through what the teacher experienced before showing the game to their students. The participants responses here cover a wide gamut of ideas. However, several stated how they used their own family members to help them obtain a level of comfort where the participants felt good enough to try the digital games in their classroom. For example, Alexa declared:

> When I am trying a new game, I use my first grader as a guinea pig especially since the majority of games that I have found are like elementary through middle school sites. I'll create a class with him in it so that way I can watch what it does. And I know it's first grade content but at least that gets me the general premises of if I think the game will work in my classroom and then I can make a test student for the grade level that I want, but that at least gives me a chance to see it from a student side and see someone mess up and get the answer wrong.

Another participant who utilizes their family members is Zora. She revealed:

> So my son and his dad a lot of times, so I'll be like okay can you guys like they are my Guinea pigs and try this really quick, so we've done that before like in the living room or at the kitchen table where they're kind of my fake students and so I've done that.

Brandy also mentioned that she utilizes her family by simply stating, "I also use my husband as a guinea pig to try out games."

Alice revealed that she uses video clips at times when she is considering the possibility of bringing a new digital game to class. Alice verbalized, "Just my own tinkering around with it. Some of them have video clips that you can watch of how they played or maybe a YouTube video of how somebody else is implementing it in their classroom." John, Brandy, Alice, Alexa, and Jones all mentioned how they experiment with the games before hand by setting up a fake class. For example, Jones mentioned:

> I'll actually set the game up and then nine times out of ten, I will play the game myself. So almost all the time, I'm experiencing the game to know what a student will experience to decide what I like and what I don't like that's easily the best way. And a lot of app or lot of games offer you that opportunity to do. Sometimes I'll even set up a student account myself, if I can.

Another way the participants had positive experiences with digital games was through encouragement from others. Several participants mention how their professional learning communities (PLC) were useful in their process, or their technology integration specialists have shown them how to utilize certain digital games. Alice mentioned:

> In our PLC's, we'll get one up if we hear of a new game and will give it a try and we meet weekly with the other seventh grade science teacher so, small group, it's just the two other science teachers here and myself.

Jones also mentioned his connections to his PLC. He said:

We do have an integration specialist as well. He's always giving ideas or at least if he's not giving ideas, he's giving us opportunities to seek out ideas anywhere from Twitter to Edmodo to wherever. So, lot of mix of all of those. Had a lot of luck just on web chats with other social studies teachers.

Alexa also mentioned the other teachers she works with, as well as, expanding into other possible areas of learning about DGBL. Alexa said:

A lot of it is other teachers and then professional development. I am working fully to make Twitter more of a personal professional development. We have a couple teachers in our building who are really good at that and I'm learning slowly from them. But mostly it's professional development, different seminar things that I've gone to and then other teachers in the classroom.

Furthermore, Sally also mentioned how she liked to learn from other professionals at conferences. Sally stated:

I'll go to NETA and go to the different things like that and see what they're doing? What other schools are doing or what they have? And I like to do that type of thing. And that's where some of it comes from as going to sessions and learning about what others are doing and they say works and what doesn't work and things like that.

Coby revealed how his tech team was helpful in learning the ins and outs of digital games. Coby said:

Just navigating to find out what some of those activities were that they had built in. Obviously, learning the game controls and learning kind of some of those

intricacies of the actual game computer, asking the tech team, things like that,

asking them questions on how do I navigate through there? Can I get the server

open at any time I wanted it? That way I could do it during my plan period. So

early on, it was a huge – it was a big learning curve.

Theme 2: Easier lesson planning and classroom management. This theme

involves how the participants perceived that, due to DGBL, managing classroom

behaviors and lesson planning was easier, or less work than if they didn't use DGBL.

There are two categories that emerged from the data related to the second theme. Those

categories are, (a) makes preparation easier, and (b) positive affect on classroom

environment. Jones, who has been teaching for 5 years as a social studies teacher

mentioned:

The digitally-based games have a few more bells and whistles to them. And they

have a lot more, there's a lot of these things and I don't have to create all of this. I

don't have to, and for me as a teacher, I don't have to. A lot of it is easy, to be

honest, is easy for me to just plug in a few things or in the case of Oregon Trail,

that's an easy prep opportunity for me for, you know, having them log in and

everything's already there, somebody else's is doing it already for me in a lot of

cases.

Alice also recounted her thoughts about making things easier for her as a teacher. Alice

said:

Another ease one is that it saved and it's there and I have to do is get on and kind

of manages itself really that the game has the built-in rules and they have to

follow, you don't have to deal with cheaters necessarily or somebody looking at somebody else's answer or you know.

Brandy also had thoughts along these lines. She revealed:

They help I guess from a teacher's standpoint of not having to recreate everything and make new things all the time to get students to interact with material.

This was also on the mind of Sally when she mentioned:

Planning is easy. Because I just – I'm planning is the number of days and in what order we do the different activities and that, I guess, that would be the biggest thing is that the planning makes it really – Planning is pretty simple when you're doing the games, it's just what order I'm going to do them and what length of time I'm going to do each one.

The second aspect of this theme was how participants viewed the positive effect DGBL has on classroom management. This ranged from making the class room more exciting to students complaining less. John mentioned this when he said, "The result I've seen is I've seen much more engagement. I see much less mumbling and grumbling." In other words, the students want to learn. Brandy mentioned the following about her experience:

The students really like to play the games. They think they are fun. They want to continue playing them which just gives them more of a chance to learn a concept. I have anecdotal evidence that they really do help students just keep asking questions or start asking questions about why something is, which in science is one of the main goals.

Sally also mentioned improved student participation and interest in the topic, when DGBL is used. She said:

> That's the nice part of it is they want to do most everything that I put before them. And I usually get very good participation. Some work harder than others, as I said before, but I really don't struggle with that part of the teaching at all. When I introduce it, and especially when we get to Minecraft, they're just head over heels for that.

Theme 3: Positive influence on students (engagement, confidence, thinking, behavior). The third theme from research question 2 is about how the participants perceived that DGBL had a positive influence on their students in multiple areas. The categories for this theme were: (a) Positive change in student engagement, (b) positive change in student confidence, (c) positive change in student thought, and (d) positive change in student behavior. Overwhelmingly, engagement was one area that the participants all agreed on. First, all of the participants mentioned how student engagement was involved with DGBL in some way, and all but one of the participants mentioned how the games were exciting or fun for the students. For example, Jones stated this about engagement and DGBL:

> Increased engagement for sure. I mean that's, that's nearly a guarantee for me that I will have students more engaged in at all levels whether it's the introverted kid or the extroverted kid or, you know, the behavior issue or the straight A's straight-laced student, it doesn't matter the demographic, it just seems to reach every demographic, girls, boys all across the board.

Brandy said the following about engagement and DGBL:

> It gets students engaged. It gets them involved. I think students feel like they have more at stake in the answers especially when I don't have to call on students and they don't think I'm picking students for answers. They have a higher level of concern.

Zora echoed these thoughts by adding her own thoughts about engagement. She stated:

> I think it keeps kids really engaged and I think it keeps them just sort of interested in class, it's something different. It gets them moving in the game. I also think just because they're so tech centered anyways with their generation.

The next category of positive change in student confidence was mentioned by several participants. Student self-esteem was noted as changed for the positive due to DGBL. For example, Zora mentioned:

> That's nice too for self-esteem because I think if I -- for example just did Kahoot! all the time, it would be the same top three winners every week and so that gives different kids a chance to be on the leaderboard and see their name in lights and things like that.

The idea of improving one's attitude about their self-worth was also discussed by Alexa when she revealed:

> The kids that I see typically feel like people have given up on them even though that's not true, but they just feel like school is so hard and that they don't want to do it anymore and why should I struggle all the time if I'm never going to get it.

And this is just one way to engage them and say like it's going to be hard but at least let's try to make it fun.

A few participants mentioned how the games made students felt confident, or less anxious. Coby declared:

I think the kids are confident for one. The kids are confident with it. There is not a lot of instructions needed on how the game works. I think that would probably be the best one, you know, in time they – it takes away that anxiety, I guess because they've probably played at multiple times that they know how to do it like I said they're more of an expert than I am at some of them.

Positive change in student thought is the third category of theme three. One example of this is when John took several students did presentations about DGBL in their classroom. He said:

We did a presentation at NETA last year where I didn't know -- I wanted to take some students along and I didn't know how many students I would have that would be interested in going and I had 36, 37 students last year. And I made it totally optional, but they wanted to fill it out, but I wanted them to be involved with it. So, I basically created a little questionnaire that if they wanted to, they had to submit their resume too, and I had 29 of the 37 students fill it out that they wanted to go, and then rocked the presentation up there. They did it all. I just basically sponsored them as they were up there.

Alexa mentioned:

Just giving them that chance to kind of take ownership, they're more like they

want to take ownership with their learning a lot of times and if you give them an

opportunity.

Sally revealed that her students were taking what they learned in her class from DGBL

and were able to transfer those skills to other classes. Sally said:

My kids will say, well, you showed us how to do this, I showed Mrs. Anderson

and she helped us to do this and this and we made it work like that. So, I've had a

little experience with them taking it from here and going on with it and showing

doing other things, they've used it. A couple of kids have used some of the stuff

we've done in here for projects in social studies or in another class. They've to do

how-to speeches and some classes and they've taken some, like the games that

we've done in and taught others type of things.

A few participants specifically mentioned how utilizing DGBL can actually help

increase test scores. For example, Alexa stated, "They learn more and so they score better

on standardized tests. And when they're feeling more confident, they're learning by the

fact that they're doing well in a game, then they're going to score better just on their

own." Jones echoed these sentiments when mentioned:

I saw an increased test result and those were in particular with boys and I would

say low-achieving boys. Boys that had achieved lower in the first quarter of tests

versus the third quarter. Because and I would see that students that used it - and I

was onto like a track, you know, how many hours and how many points students

acquired over time. How many times they went through a specific review game.

And a lot of times, come test time all of a sudden, I had students that previously, I believed not to be studying, all the sudden were using the app and enjoyed using it and consequently had studied and then succeeded on the test.

Student behavior rounds out the fourth and final category for theme three. In this category the participants discussed how their students were showing improved effort and exhibiting fewer behavior problems when using DGBL compared to other models of teaching. They also discussed how students were utilizing the games on the weekends, or outside of the classroom environment. John stated:

It's amazing how I will have students, because in Classcraft they can use their different powers and they can level up and they can answer some questions that go along with it. I have students on Saturday afternoon that are logging in to Classcraft to do these sorts of things.

Brandy also mentioned the students utilizing what they learned by using DGBL at home. She said:

Some of the games they then try to take it further. They try to take the concepts and they are like okay. Because there are like legends of learning. I used that a few times and they look at something and they go, Okay well what about this? So some of the results are just the kids asking questions or the video games that they play at home, the game, computer games that they play home they end up saying, 'Oh well this relates to what I do at home.' So they are drawing those connections on their own.

Sally mentioned that she rarely has behavior problems when incorporating DGBL. She

stated, "I never have behavior problems when we're doing that type of work in the class. I

rarely do have kids dislike coming to class or not." Alexa also mentioned how her

students act when DGBL is involved. She said:

> The fact that kids think it's fun. Automatically when you put the word game to
>
> something, they automatically go oh, this is going to be fun, I'm going to enjoy
>
> this. So they're already more ready to learn and on track and listening and
>
> focused, than if you're like hey, we're going to pull out your notes because it's a
>
> game and game automatically makes kids think of fun.

RQ 3: Negative Influences from DBGL

Numerous categories emerged from the data for the third research question.

Through the use of multiple interview questions, the participants discussed their

perceptions of the negative influencers to incorporate DGBL in their classrooms. From

those categories five major themes were developed. The themes were:

1. Technical difficulties

2. Lack of self-efficacy

3. Perception of more difficult classroom management

4. The need for flexibility/backup plan

5. Time constraints

Theme 1: Technical difficulties. The technical difficulties theme looks at how

the participants were negatively influenced by technological issues such as lack of

internet, or software and hardware issues. Under the first themes of research question

three were two categories. These categories were derived from the participants responses to the interview questions. These categories are: (a) Technical concerns and (b) lack of access to digital games. When asked about the drawbacks to using DGBL in the classroom, with minimal hesitation, the participants all mentioned technical concerns. Zora mentioned this about technology issues:

> I guess the downfall with the technology is that sometimes we just do have tech issues. If I do the good old Fly Swatter that's always going to – and I haven't done it for years, but it's – it's always going to happen unless the building burns down. Like I can still do that whereas sometimes and it doesn't happen too often, but like our server is on the Fritz and so then you could necessarily always use it. I mean Internet isn't as nice and dependable as you want to see all time.

Sally echoed these thoughts by stating:

> When technology goes down it isn't too good. And we have had our issues here recently that our network hasn't been the best so, that we come up with quick extra plans that worked on what we plan to do. If they don't have their technology, it's – I know then that that day is being kind of lost but at least they've worked their minds a little on the games.

Jones also conveyed his thoughts on when technology issues happened in the classroom. Jones declared:

> There's always the technical difficulties, when our internet, whether it's a user error on my part or whether it's, it's an infrastructure error on the part of the district or whether it's an, an error on the, on like the app or the web-based

company, the gaming company. Those are always the, you know, the toughest to

deal with.

Coby had the following thoughts about when the technology goes out in his school. Coby

expressed, "I mean, technology is technology. It's great when it works, and it's not great

when it doesn't. Kids think that I can control it lagging and stuff like that, and that gives

them an opportunity to complain."

Another category for this theme was lack of access to digital games. This category

focuses on the lack of student access to digital games, from either having no access to

technology, or advertisements causing issues to get into the game, or even the games

being blocked by the school district. Alice mentioned how several of her students do not

have access to internet at home, which can lead to problems with homework. Alice said:

I mean, I have the kids download those because a lot of them don't have Wi-Fi at

home because they use your data and so they won't access it on an app at home.

And so just, they only have the computers here at school to use it.

Alexa also mentioned how it is possible that she might find a game she wants to use with

her students from home, but then it is blocked at school. Alexa stated:

I'm looking two or three weeks ahead and then it gets pulled or it's blocked by our

administrator like our technology department, because the site maybe has bad ads

or something which -- so that's the other hard part is combating where the game

might be okay but some of the ads aren't, so then the whole site is blocked.

Zora also mentioned how students can forget passwords; and therefore, will not be able to

access the game without resetting the password. Zora declared, "I mean they all have an

account, so I guess sometimes remembering the password or something like that to get on, but then you are always like, hey somehow you don't remember, let me reset it."

Theme 2: Lack of self-efficacy. This second theme, lack of self-efficacy, was once again mentioned by every participant in some fashion. When looking at this theme the participants expressed some form of self-doubt, or lack of confidence about using DGBL in their classrooms. The category for this theme was minimal self-efficacy. When discussing DGBL in the classroom, Sally made comments like, "I'm not very good at it." or comments like, "Well, if I can find a training, I try to. But with the budget as it is, trainings aren't offered very often." John has similar comments about his lack of expertise, even though he is seen by many in the state as a DGBL leader. John said, "I'm by no means an expert in it and my kiddoes figure it out very quickly." John also said this about using DGBL in the classroom:

> I have an easy enough time making myself look silly up in front of them that I don't need to not know an answer. Well, what happens after this? And I know that I should be able to say I don't know, but just kind of my nature is I like to be able to think ahead and answer those questions before they come up. So yeah, I try to play everything and make sure I'm comfortable with it before I open it up to my seventh graders.

Coby talked about how his students are often times more of an expert than he is when it comes to digital games. Coby revealed:

> I was not an expert at Minecraft and it was – it was tough for me, to make myself vulnerable here, but it was tough for me to actually let kids get up there and tell

their friends how to run the game. But that's learning as well. That's tough as a

teacher to have somebody else that's 12, 13 years old, sound like more of an

expert than you are.

Zora said the following about her students being more technologically capable than

herself. She said:

I usually do not have to pre-teach, these kids are so tech savvy that they probably

know more about it than maybe even I do when I try some things for the first

time. So okay, well, let me go home and experiment with it so I don't look

completely clueless when I get this for class.

Jones also mentioned how when he first started using DGBL that he lacked the

knowledge of digital games to fully incorporate DGBL into his classroom. Jones

declared:

When I started using his Zondle, initially that was in my first year, that's when I

didn't have kind of a wealth of digital gaming apps. I knew that I wanted to kind

of evolve, so my first, the first few tests that I had had throughout the year were

done without the app, without the usage of the app.

Theme 3: Perception of more difficult classroom management. Perception of

more difficult classroom management is a theme where the participants discussed how

DGBL might make the classroom environment more difficult to manage. The codes from

the participants responses lead to two categories for this theme. The categories were: (a)

classroom management concerns and (b) distracted students. This theme was

representative of discrepant data when looking at the positive influencers of incorporating DGBL.

Alice brought this idea to light when she said:

Maybe you just can't control the validity of those people that are just going to push a random answer just because, you know, the ones that they are messing around with or I call it "sabotaging" just purposely clicking the wrong answers or I can tell that they're not engaged as much. They don't think that they can win or not trying to win.

Alice said the following about DGBL and her student's reaction to the experience:

Sometimes it does have a negative effect on classroom management because they get a little ramped up and hyper where as opposed to some of the other activities or lessons I might do might be more mellow and calming. I don't know too many of the online tools that I use that would have like a calming effect. I think it would be the opposite in kind of get them ramped up a little bit so, for the most part, they're pretty competitive, so they get fired up.

Bandy said the idea that digital citizenship becomes an issue for her to manage when using DGBL. She said:

And when some students interact they, they're still a middle schooler – a little bitty high schooler - and they aren't quite mature enough to work together or know how to interact online. It's just social skills and especially online social skills that they necessarily haven't been taught at home and so we have to set ground rules every time and that takes a little while.

Jones also mentioned how classroom management might be an issue at times. He said:

> Sometimes classroom management can be tough. It adds a little bit of a twist to classroom management depending on the game. The – and then with that is noise level and just overall control of middle school kids, which is really it. Like getting loud, rowdy and so you know we have that to manage that is a little bit tougher than, you know, in another setting.

All but three participants mentioned how competition could present itself as a negative while multiple participants mentioned that competition could be positive as well. An example of this comes from John who stated:

> For your students that aren't competitive, I thought that it might be just something that would continue to kind of leave those students behind. Although, you know, the competition is fine. Friday night on the football field and Saturday nights on the basketball court and the real world is a competitive nature. So, I think the sooner you can introduce them into this competitive aspect, I think the better. However, I mean at times I guess you can have kids that are well, you know, I'm a level seven, you're only level two, that sort of, you know, it's just another status symbol I guess which in junior high can be an issue no matter what you're doing.

Zora mentioned how competitive students can get the rest of the class rowdy and off task. She said, "I think it would be the opposite and kind of get them ramped up a little bit so, for the most part, they're pretty competitive, so they get fired up and off task at times." Alice also mentioned how the competitiveness can be an issue for the students who do not process as fast as others. Alice said:

The competitiveness is an issue, although there is a positive aspect to the

competitiveness as well, but for those slower processors to continue to try to keep

them engaged, and hopefully involved with the thought that they can still win

even if they're not maybe the fastest to answer.

Jones also mentioned competition when he said:

I would say, the negative aspects of competition can come out. I feel like it's on

one hand I, you know, I definitely want students to experience competition

because I think that's authentic to life. But at the same time it can be distracting to

actually learning the content. So and when we talk about instances of bad

sportsmanship or gloating or you know in not being good winners and things like

that, which do lead to good life lessons.

The next category for this theme is students are distracted. Sally mentioned that

her students can get distracted from the task at hand because they would rather play

digital games. Sally expressed:

The only downside maybe would be that they immediately think as soon as they

get a computer that they could play games instead of work and I'm sure that

there's some English teachers that don't appreciate me when it comes to that. They

don't want to write that paragraph they want to play that game.

Brandy also mentioned that students get distracted. She declared:

Sometimes it's just the distraction factor. When they are not being one-to-one,

they are not used to having a computer in front of them or an iPad or some device

in front of them all the time. And so they do get distracted. The fact that they have

a device in their hands and they want to go explore other things.

When John discussed students being disengaged, he simply stated, "Just some students are a little less engaged and interested in it than others. Zora mentioned that if she uses a game too much that the students might lose interest in the topic. She declared:

Sometimes you just have to take a break period just because you don't want to be

one-trick pony, you know, and just kind of beat something to death. So then you

might switch off to something else not because that was bad, but you just think,

you know, we need to look at something different, we're kind of getting tired of it.

Theme 4: The need for flexibility/a backup plan. Theme four is about the need for teachers who incorporate DGBL to be flexible, or to always have a backup plan. John mentioned how this can be a problem, especially if a student does not bring their device to play the digital games on. John said:

If your Internet's down or you have, you know, our students are one-to-one with

Chromebooks. If they don't have their Chromebook with them it can be tough to

try to have makeup plans in that situation. It's not, you know, Tommy forgot his

notebook, so someone else lend him a piece of paper that day. That student will

have to do something different.

Alexa mentioned how her students want everything to be a game, but there are not enough games available, and that sometimes the games do not have students show their work, which is of up most importance in math. Alexa said:

It's hard because they want to do everything game-based then, because it's fun and it's not as hard but you can't. I mean especially with math, there're three or four steps and if you don't understand those three or four steps, then you're going to skip something on the games. The hard part is that they don't always show work when they're working on games because they just do it in their head or they do it on paper but they can't always tell me what they didn't. And so really working on trying to get them to say what exactly did you do, so that way I know you understand games don't always give you that opportunity or most the time don't give you that opportunity.

Jones said the following about needing to be flexible and have a backup plan:

There's always a back-up plan or I'm just taught to be flexible or taught to use my improv skills to adjust. But often times yeah, I've learned just throughout these five years, it's always nice to have a back-up plan or at least a hardcopy plan. There's always going to be students that don't come, that come in without a device, because they got it taken away, something happened to it, they dropped it and it broke, you never know when the Internet's going to go down. So you always have to have a back-up plan and that's usually an easy fix.

Coby also mentioned the need to be flexible. Coby stated, "Obviously just being flexible as a teacher if technology is not available that day, but that's the time that you wanted to incorporate it. It's just being flexible in planning." John also mentioned the need for a backup plan. John expressed:

I could see some districts, especially the one-to-one districts, that could have some problems with it. You always have to have a backup plan because here, it's been a couple years ago, but technology can really handcuff you if everything and it's not just digital gaming but digital in general.

Theme 5: Time constraints. The fifth theme was about time issues teachers experience when incorporating DGBL. This could be that the games were too time consuming, the set up takes too long, or there was not enough time to practice with the digital games and obtain a comfort level high enough to be able to bring the games into the classroom. One example of this came from Coby when he stated, "Just building it, the first time that you're actually creating – creating a game that you want them to play, just that – just that can be time consuming." Zora also mentioned the fact that time can be an issue when utilizing DGBL. She discussed that she still has multiple suggestions of games to try in her mail box, but that finding time to utilize them is difficult. Zora said, "I can't keep up, I have four suggestions still saved in my inbox that I haven't had a chance to try yet."

This is what Alexa had to say about time constraints. She said:

That's the hard part because then the kids start expecting it because they enjoy it and they want to learn that way, but you go I only have so much time in the days that by the time you find a game and play it sometimes it gets pulled or it's blocked.

Jones also mentioned how time had gotten away from him when trying to incorporate DGBL into his lessons. Jones stated:

You know, there's been times where in my first couple of years I've put two plus hours into trying to create a digital game or figure out the digital game. And I haven't been able to do it and that was two hours of playing time wasted.

RQ 4: Differences Between Early and Later Adoption of DGBL

I sorted data into three groups based on when in their teaching career participants began to use digital games to help answer Research Question 4. Group 1, those participants who adopted DGBL within their first 3 years of teaching, included two participants; Alexa and Jones. Group 2, those participants who adopted DGBL within 4 to 7 years of beginning to teach, was made up of three participants; Zora, Brandy, and Alice. Group 3, those participants who adopted DGBL 8 or more years into their teaching career, was also made up of three participants; Sally, John, and Coby.

Use of DGBL. When comparing the three different groups of participants it became clear that there were some shared ideas among all three groups, some ideas shared with only two of the three groups, and some ideas that were specific for one group. In each section below, I discuss the similarities and differences among the groups by theme.

Theme 1, engaging students in content and real-world experiences was a use of DGBL expressed across all three groups. In looking at the categories within that theme, one idea that all of the groups mentioned was how DGBL can reach different students than a traditional classroom lesson. The codes, reaches different population, reaches different audience, and exposure to computers are all indicative of the participants

mentioning that DGBL helps to reach students who might not be as successful in a traditional classroom.

Making content real was a category that all three groups shared opinions and expertise about. The codes role-playing, real world connection, and makes concepts more real were represented in every group. The category, content specific games, also was represented in all three groups, especially where the participants discussed for what subject matter they specifically use DGBL.

Theme 2 was about using DGBL to support creativity and skill building. There appeared to be differences between the groups in this area. While all groups mentioned using DGBL to build skills, the idea of using DGBL to support creativity was discussed only by teachers in Group 3, those who began integrating DGBL 8 or more years into their teaching career. All three members of Group 3 mentioned how they used DGBL for students to build or create something. These concepts were absent from all other participants interviews.

Theme 3 indicated DGBL was used to promote teamwork and communication. All three groups reported using DGBL for team work. All but one participant, Alexa, mentioned teams, teamwork or collaboration, and that is because of the type of class that Alexa teaches. As she is a special education teacher, Alexa's class was much more individualized and did not rely on students being able to work together or in a collaborative manner. However, the idea of using DGBL to promote communication skills was not discussed during the participant's interviews from Group 1, those who had incorporated DGBL early in their teaching.

Theme 4, to individualize learning was present across all interviews. DGBL was seen as a tool to help support individual student needs.

Theme 5 showed DGBL was used to collect feedback from students and for assessment purposes. All participants discussed the use of DGBL for gathering feedback. Theme 5 also looked at using DGBL as an assessment tool, whether formative or summative. Group 1 did not mention the use of DGBL for assessment, those who began using DGBL within 3 years of beginning teaching while those in the second and third groups mentioned it multiple times throughout their interviews.

Theme 6 indicated DGBL was used for classroom management, including categories related to general classroom management and to using DGBL as a time filler.

Both the Group 1 (within 3 years) and Group 2 (4-7 years) had participants who mentioned they sometimes used DGBL as a time filler. This concept did not come up in the interviews with the participants in the Group 3 (8 years or more). The ideas of using DGBL to make classroom management easier was mentioned only by participants in Group 3, the most experienced teachers.

Table 2 shows the similarities and differences in how teachers used DGBL across the three groups.

Table 2

Group Comparison of DGBL Usage

Use of DGBL themes	Group 1 first 3 years	Group 2 4-7 years	Group 3 8+ years
1. Engage students in content and real world	• Reaching different students • Making content real • Content-specific games	• Reaching different students • Making content real • Content-specific games	• Reaching different students • Making content real • Content-specific games
2. Support creativity and skill building	• Skill building	• Skill building	• Skill building • Support creativity
3. Promote teamwork and communication	• Teamwork	• Teamwork • Communication	• Teamwork • Communication
4. Individualize learning	• Individualize learning	• Individualize learning	• Individualize learning
5. Feedback and assessment	• Feedback	• Feedback • Assessment	• Feedback • Assessment
6. Classroom management	• Time filler	• Time filler	Classroom management

Note. DGBL, digital game-based learning.

Positive influence from DGBL. All categories and themes were represented by all three groups for the second research question. Theme 1, positive experiences with digital games, was represented across all three groups of participants. There were some interesting items to point out. For example, when looking at the category, *teacher experience with games before showing the students*, Group 2 was represented by

comments at nearly a 2:1 ratio when compared to the other two groups. Whereas the opposite was true when looking at the category, *encouragement from others*. In that category Groups 1 and 3 are represented by almost a 2:1 ratio of comments when compared to Group 2.

Theme 2 was represented across all groups. However, another interesting outcome was under the category--*makes preparation easier*. This is because over half of the comments made by the participants of group two revolved around data and feedback. Responses from Groups 1 and 3 were more diverse when looking at this category.

Theme 3, *positive influence in students (engagement, confidence, thinking, behavior)*, was discussed by all three groups. Overwhelmingly, the category that all groups mentioned in abundance, and as being the most beneficial for using DGBL was the *positive change in student engagement* category. The idea of student engagement and excitement was very apparent throughout all participant interviews. The themes *positive change in student confidence*, *positive change in student thought*, and *positive change in student behavior*, were also represented by each group. However, the category, *positive change in student behavior*, was only mentioned twice by Group 2, whereas, Group 1 mentioned it six times and Group 3 mentioned positive change in student behavior five times. Table 3 shows how the groups compare when looking at positive influencers.

Table 3

Group Comparison of Positive Influencers

Positive influence themes	Group 1 first 3 years	Group 2 4-7 years	Group 3 8+ years
1. Positive experiences	• Teacher experience • Encouragement from others*	• Teacher experience • Encouragement from others	• Teacher experience • Encouragement from others
2. Easier lesson planning and classroom management	• Make preparation easier • Positive affect on classroom environment	• Make preparation easier • Positive affect on classroom environment	• Make preparation easier • Positive affect on classroom environment
3. Positive influence on students	• Engagement • Confidence • Thinking • Behavior*	• Engagement • Confidence • Thinking • Behavior	• Engagement • Confidence • Thinking • Behavior

Note. * proportional differences across groups.

Negative influences on DGBL. When answering this question, the participants

from all three groups agreed on the majority of the categories and themes. That being

said, there were two categories that Group 2 did not mention as being a negative

influence on using DGBL in the classroom: *flexibility* and *backup plan.* Furthermore, a

theme of note arose. While being representative of all three groups, the theme *lack of*

self-efficacy was overwhelmingly represented by Group 3, the more experienced teachers

who began using DGBL 8 or more years after they began teaching.

Theme 1, *technical difficulties*, was represented across all three groups in fairly

equal proportions.

Theme 2, *lack of self-efficacy*, was mentioned by group three members numerous times. At a rate of 3:1 compared to group two and a rate of 16:1 when compared to Group 1, members of Group 3 made a minimum of 16 comments about their lack of expertise, or confidence in using DGBL in the classroom. On the opposite end of this spectrum are the members of Group 1, those who more recently entered teaching, who only made one comment overall about their lack of expertise in utilizing DGBL.

Theme 3, *classroom management*, categories were represented across all three groups at fairly even rates.

Theme 4, *need for flexibility and a backup* plan, is where the data shows a split between the groups. For example, Group 2 did not mention either category in this theme. The two categories which group two members did not mention were *teachers must be flexible* and *teachers need a backup plan.* Both of these categories were well represented by Group 1's comments in their interviews, and only marginally represented by the members of Group 3.

Finally, Theme 5, *Time constraints*, was mentioned by each group. Table 4 shows how the groups compare when looking at negative influencers.

Table 4

Group Comparison of Negative Influencers

Negative influence themes	Group 1 first 3 years	Group 2 4-7 years	Group 3 8+ years
1. Technical Difficulties	• Technical concerns • Lack of access to digital games	• Technical concerns • Lack of access to digital games	• Technical concerns • Lack of access to digital games
2. Lack of self-efficacy*	Lack of self-efficacy	Lack of self-efficacy	Lack of self-efficacy
3. Classroom management	• Classroom management • Student distraction	• Classroom management • Student distraction	• Classroom management • Student distraction
4. Flexibility/backup plan	• Flexibility • Backup plan		• Flexibility • Backup plan
5. Time constraints	Timing issues	Timing issues	Timing issues

Note. *proportional differences across groups.

Summary of Findings

Key findings for how middle school teachers describe their use of DGBL in their classrooms as the following: (a) to engage students in content and real-world experiences, (b) to support creativity and skill building, (c) to promote teamwork and communication skills, (d) to individualize learning, (e) for feedback and assessment, and (f) for classroom management and to fill time. Key findings also point to positive influencers for incorporating DGBL in the middle school classroom as: (a) the teacher's own positive experiences with digital games, (b) the perception of easier lesson planning and classroom management, and (c) the perception of positive influence on students (engagement, confidence, thinking, behavior). Negative influencers were: (a) technical

difficulties, (b) lack of self-efficacy, (c) perception of more difficult classroom management, (d) the need for flexibility and a backup plan, and (e) time constraints.

When looking at key findings for the differences in use and perceptions comparing the experiences of three groups of teachers based on when in their teaching career the teacher began using DGBL. The results were varied. For RQ1, which had the most diverse responses, teachers who had more recently begun teaching and using DGBL 3 or less years never mentioned using DGBL for assessment or to promote communication. While teachers who had been teaching longer and began using DGBL 8 or more years into their career were the only participants to mention how they used DGBL to support creativity and they did not mention using DGBL as a time filler that both other groups did.

RQ2 contained the most similar responses across all three groups, with only proportional differences in encouragement from others, and perceived positive influence on student behavior. All themes were evident in all groups.

RQ3 showed group 2 teachers who began using DGBL 4 to 7 years into their careers never mentioned the need for being flexible or the need for a backup plan. RQ 3 also showed that in terms of confidence level in incorporating DGBL teachers who were more experienced and began using DGBL 8 or more years after they began teaching had much less confidence than the other two groups.

Conclusion

In Chapter 4, I discussed the results of a research study concerning middle school teachers' use and perceptions of DGBL. RQ 1 contained 6 themes about middle school

teachers use of DGBL, while RQ 2 had 3 themes about the positive influencers around

DGBL. RQ 3 then ended encompassing 5 themes about negative influencers for

incorporating DGBL. RQ 4 showed there were some differences in opinion about DGBL

based on the years of teaching experience the participants had, and when they

incorporated DGBL. This also included a look at the data collection methods, as well as,

the data analysis process. Chapter 5 contains a detailed discussion about the results,

which includes conclusions about the findings and how the findings connect to the

literature and to this study's conceptual framework. Furthermore, future

recommendations for practice, policy, and future studies will be discussed.

Chapter 5: Discussion, Conclusions, and Recommendations

My purpose in this qualitative study was to better recognize how middle school teachers used DGBL in the classroom and what they observed as factors influencing their decisions to include DGBL in their classrooms. I also explored possible differences in use and perceptions based on when in their teaching careers the teacher began using DGBL. By understanding the positive and negative influencers on incorporating DGBL in middle school classrooms teachers, administrators, and professional development leaders can better communicate ways in which educators can effectively bring DGBL into the classroom setting and policy makers can better understand obstacles to incorporation of DGBL that could be addressed and factors that support incorporation that could be strengthened. Understanding these reasons could also promote positive social change by encouraging another tool for middle school teachers' use in the classroom, one that based on the data has a positive influence on students and their learning experiences.

The major sections of this chapter include an interpretation of the findings, as well as the limitations of this study. I also include the recommendations for future studies, implications for positive social changes, and a conclusion.

Interpretation of Findings

In this section, I will consider how the findings from this study link to the research literature that I reviewed in Chapter 2. I will then consider how the findings align to Rogers's (2003) theory of diffusion of innovation, which was the framework that I used in this study.

Connections to the Literature

Several ideas exist in the literature regarding positive effects of DGBL use in the classroom that the findings of my study seem to support, at least from the teachers' perspectives. Teachers in this study reported that use of DGBL enhanced students learning, collaboration, critical thinking, and motivation and engagement. These align with other studies that support these benefits of DGBL in the classroom. My findings, however, were less aligned with the literature in terms of the factors that hinder adoption of DGBL in the classroom.

All groups in this study believed DGBL helped students retain information better and do better on assessments. Studies in the literature support the finding that DGBL positively influences achievement or learning outcomes (Chee et al., 2013; Fe & Abras, 2012; Hess & Gunter, 2013; Hsiao et al., 2014; Shin et al., 2012; Sung & Hwang, 2013).

Groups 2 and 3 in this study found DGBL improved communication and collaboration among students and with the teacher. This aligns with studies in the literature that indicate use of DGBL can improve collaboration skills of students (Magnussen et al., 2014; Pareto et al., 2012; Shah & Foster, 2014; Van Eaton et al., 2015).

Teachers with more teaching experience in this study (Group 3) reported using DGBL to develop and support critical thinking and problem solving. Critical thinking and problem-solving skills have been shown in the literature to increase with the use of DGBL in the classroom (Eseryel et al., 2011; Lee et al., 2016; Yang, 2012).

All three groups in my study believed that DGBL increased student motivation and engagement. The literature review revealed that studies of DGBL have generally found an overall positive influence on student motivation and engagement (Braghirolli et al., 2016; Chen & Law, 2016; Filsecker & Hickey, 2014; Little, 2015; Perry & Klopfer, 2014; Yan, 2012). Improved motivation and engagement were by far the most discussed influences of DGBL among teachers in this study.

When looking at the research about in-service teacher's perceptions of DGBL, Baek (2008) found that six things hindered teachers from incorporating DGBL in their classrooms: (a) inflexibility of curriculum, (b) negative effects of gaming, (c) student's lack of readiness, (d) lack of supporting materials, (e) fixed class schedules, and (f) limited budgets. Millstone (2012) found three barriers to incorporating DGBL into the classroom: cost, lack of technology resources, and emphasis on standardized test scores. Funding was only mentioned by one teacher in the current study as an issue in adoption of DGBL, whereas emphasis on standardized tests, inflexibility of the curriculum and students' lack of readiness were not mentioned at all. Perhaps with so many free or low-cost digital games and apps today, cost is less a factor. The lack of readiness may have been an issue in 2008, but given students interactions with digital games today, it is not surprising this did not come out as an issue in this study. Teachers did discuss possible negative effects of DGBL, primarily related to potential for distraction. Access to technology, although mentioned in the current study, was more about access at home rather than in the school. Therefore, these findings seemed to differ from the literature.

One finding in this study was not evident in the literature that I reviewed. Teachers in this study reported that the use of DGBL made their own lesson preparation easier and helped them in classroom management. Their perceptions were more about how DGBL made the teacher's lives easier, not the game itself being easy to use as reported in other studies (Proctor 2013; Stieler-Hunt & Jones, 2015). In addition, although most of the literature focused on what hindered adoption of DGBL into classrooms (Sáez-López et al., 2014; Stols & Kriek, 2011), there was little, if any, literature that examined classroom management as an issue.

Connections to the Conceptual Framework

According to Rogers (2003) there are several factors that influence people in adopting or rejecting an innovation. These are (a) relative advantage, (b) compatibility, (c) complexity, (d) trialability, and (e) observability. Stieler-Hunt and Jones (2015) echoed these factors in their study of DGBL saying there was a need for improvement in teachers' perceptions of the relative advantage of using DGBL in the classroom and in the observability of positive results when using DGBL. They also reported that DGBL needed to be less complex, easier to experiment with, and that teachers needed a better understanding of the role of DGBL in the classroom.

In the following discussion, I look at the factors found in Rogers's (2003) theory and how the findings of this study align with those factors. According to Rogers, the relative advantage of an innovation refers to the degree to which the innovation is seen as better than the idea that came before the innovation. In this study, teachers reported that DGBL was better than traditional methods in engaging students in content and

individualizing instruction and provided an easier mechanism for feedback and assessment. They also perceived its advantage in lesson preparation and classroom management and felt that DGBL had a positive influence on students' engagement, confidence, thinking, and behavior. Clearly in this study teachers saw DGBL as having a relative advantage over traditional instruction and was a positive factor adoption.

Compatibility, according to Rogers (2003), is the degree to which an innovation is seen as matching the current values, past experiences, and needs of the adopters. Findings in this study seem to indicate that teachers saw DGBL as compatible with their needs. They felt DGBL supported creativity, skill building, teamwork and communication, all important learning goals for students. Demands on teachers to individualize instruction and to provide feedback and measure improvement through assessment were met using DGBL. It seems DGBL met a number of their perceived needs and supported instructional goals and what they were trying to accomplish in the classroom. Compatibility was a positive influence in teacher adoption of DGBL.

Complexity is the degree to which an innovation is easy or difficult to use (Rogers, 2003). Complexity was the first concept identified as both a negative and a positive influence in this study. Teachers in this study found DGBL easy to use for both formative and summative assessment and perceived that there was peer support with DGBL available to them when needed, both positive influences. However, many had a lack of self-efficacy regarding DGBL, believing their students knew more than they did, and they were discouraged by technical difficulties Comments related to self-efficacy indicated that teachers may see DGBL as complex to learn and the time necessary to

learn to use the game might be interpreted as related to complexity. Comments also pointed to complexity related to technical difficulties that the teachers could not resolve and the need for more planning for such events. Findings in this study indicated that complexity did influence participants' use of DGBL. If games are considered difficult for the teacher to learn, or to take too much time to learn, or to introduce complexity into planning or delivery of instruction, teachers may be less likely to adopt DGBL.

According to Rogers (2003), "Trialability is the degree to which an innovation may be experimented with on a limited basis" (p. 258). Trialability in this study was also both a positive and negative factor. Participants mentioned how they experimented with different digital games before using them with their students and how results of their experiments and encouragement from others to try games positively influenced their decision to adopt DGBL. However, the amount of time needed for experimenting was felt by some to be too time consuming. They also expressed frustration when they could play a game at home to experiment, but then return to the school to find that the digital game was blocked by the school's servers. Rogers mentioned the easier an innovation is to try, the more quickly it will be adopted. Perhaps trialability is a factor that keeps more DGBL from being used in classrooms across the country.

Observability is the degree to which the results of an innovation are visible to others (Rogers, 2003). Teachers observations of the influence of DGBL on students seemed to be a positive factor in adoption. They gave specific examples of DGBL supporting creativity and skill building, promoting teamwork and communication, helping struggling students through individualization, and providing visual feedback to

teachers so they could better target instruction where needed. All participants reported visible improvements in student engagement, confidence, thinking, or behavior. These observable results encouraged them to continue the use of DGBL. They saw DGBL as supporting observable positive results for students in their classrooms. These findings support observability as an important factor in teacher decisions to adopt DGBL.

Overall, the findings of this study support Rogers's (2003) theory of the factors that influence individual teachers' decisions to adopt and continue to use DGBL. However, there is one caution. There were negative influencers that if left unchecked could lead to what Rogers referred to as disenchantment-discontinuance. Disenchantment-discontinuance is the decision to reject an innovation due to unsatisfying results with its performance. These negative influencers include: lack of self-efficacy, technical difficulties, the need for flexibility and a backup plan, time constraints, and classroom management. Table 5 shows how the themes identified in this study align with the factors identified in Rogers's theory.

Table 5

Links to Rogers's Theory

Relative advantage	Compatibility	Complexity	Trialability	Observability
• Engage students in content & real-world • Easier lesson planning & classroom management • Positive influence on students	• Support creativity & skill building • Promote teamwork & communication • Individualize learning • Feedback & assessment	• Feedback & assessment • Positive Experiences – Lack of self-efficacy – Technical difficulties – Flexibility/backup plan	• Positive Experiences – Time constraints	• Support creativity & skill building • Promote teamwork & communication • Individualize learning • Positive influence on students – Classroom management – Technical difficulties

Note. • Represents a positive influencer; – represents a negative influencer.

This study helped extend our understanding of Rogers's (2003) DIT by adding depth

to the literature and knowledge of what might cause educators to adopt or reject the use

of DGBL in the middle school classroom. Table 5 summarizes how teachers perceived

the relative advantages to incorporating DGBL, including engaging students in content,

easing lesson planning burdens, and influencing students positively in many ways,

including learning. It also appeared that they see DGBL as compatible with goals they

believe are important in their profession. In terms of trialability, they appeared to see a

need for more time to try out the games, a common complaint from teachers in

incorporating many things into the classroom. However, they also had several issues with

complexity that may negatively influence DGBL for which strategies could be developed

to address, such as reducing technical difficulties and improving self-efficacy. Finally, with observability they generally saw positive results for students and DGBL as a possible tool for increasing student potential.

Limitations of the Study

One limitation to this study was the small sample size of eight participants, which limits utility and generalizability. Furthermore, the participants of my study may not be representative of teachers in other parts of the United States. Rural locations of the participants and differences in populations in various geographic areas may not reflect what happens in urban or other type school settings or schools in other regions. In addition, I only focused on teachers who were members of NETA, which does not represent all teachers in the state of Nebraska; and therefore, might not be representative of all teachers in Nebraska. This study also relied on teachers being truthful and accurately identifying themselves as having used DGBL and as having at least three years teaching experience. Participants may not have answered the questions truthfully during the interview or may not have remembered accurately. Only middle school teachers were represented in this study. Therefore, teachers from other levels, elementary and/or secondary, may not share the same views about DGBL. Finally, I was the only researcher who coded the data, and while a code-recode strategy was used, a different coder might have coded differently and perhaps made other conclusions.

Other limitations resulted from the implementation of the study. Reliance on the NETA call for volunteers did not result in sufficient volunteers. This led me to ask the two teachers who did respond to pass the information on to others they knew who fit the

criteria and might be willing to volunteer. That led to additional volunteers who also then passed information on to others they know. This approach further limited the generalizability of the findings as these teachers knew one another.

A second limitation arose as the recruitment did not lead to sufficient numbers of participants that fit the original three groups of teachers, based on years of teaching experience. The groupings had to modified to be based on years of teaching prior to implementing DGBL. This led to three groups, those who adopted DGBL within their first three years of teaching, 4-7 years, and 8 or more years after beginning to teach. Thus, no generalizations can be made based on strictly years of teaching.

Recommendations for Future Research

Through this study, it became apparent that further study around the topic of DGBL in the middle school classroom is needed. Additional research could expand the participant pool (larger sample sizes) and include teachers from urban areas and regions other than the Midwest. Furthermore, research could be conducted to find ways to boost the confidence of middle school teachers that have been teaching for eight or more years in using DGBL in their classrooms. Time should also be given to furthering the research around which specific digital games help in maintaining a positive classroom management atmosphere for middle school classrooms and which types of games are most effective in engaging students in learning. Another possible area for research could be how middle school teachers experiment with digital games both in and out of school before choosing which ones to play. This could lead to new concepts for training teachers on how to incorporate DGBL in their classrooms. Finally, a large study could take place

that would revolve around discovering what digital games are available for each content area at a middle school.

Implications

DGBL in the middle school classroom has been around for several years but had not yet been researched from the perspective of middle school educators. The data and results from this study add to the knowledge base of middle school teacher use and perception of DGBL. Implications for policy, practice, and social change based on the results of this study are applicable for teachers, administrators, technology coordinators, preservice and professional development providers, and policy makers.

Implications for Policy

One implication for policy, based on the results of this study, is that policies could be made to provide teachers time to experiment with games, ether as part of structured professional development, or in working with their teams. Based on this study, results have shown that teachers are more confident in using DGBL if they first experiment with the digital games before showing the digital games to the students. This study also found that teachers were more willing to try DGBL when others encouraged them to do so, as was consistent with the literature (Stieler-Hunt & Jones, 2015). Perhaps policies could be formed to provide for release time for teachers who are already successful at incorporating DGBL into their classrooms in order for them to work one-on-one or in groups with other teachers to bolster the confidence of newer users

Implications for Practice

An implication for practice is that preservice programs and school district professional development programs could provide supports to help increase teacher awareness of DGBL specifically focusing on classroom management techniques for properly utilizing DGBL in the classroom. They could also help teachers see how DGBL could aid them in lesson planning. This awareness of better classroom management techniques while using DGBL and DGBL relationship to lesson planning could help middle school teachers and students both benefit more from the advantages DGBL provides when compared to traditional teaching methodologies.

According to several recent studies students were constantly being distracted from school work by technology not suitable for the classroom environment, such as random internet sites and entertainment media (Armitage, 2015; Lenhart et al., 2015; Rideout, 2015). Changing practices to include more DGBL in the classroom could focus students' attention on technology in ways that support engagement and learning in the content.

Implications for Social Change

One implication for social change could be for the game design industry, teachers, and students. It was mentioned by a majority of participants in this study that there were not enough content specific games. For example, there are historical games and games about social studies content in general, but participant Jones asked for games about specific aspects of history, such as the railroad boom, or the Monroe Doctrine.

Participant Coby also mentioned the need for more educational games from the gaming world. Coby stated, "I think the gaming world could probably have a boom if

they got into the educational system. I think the gaming world could make beaucoup bucks in the educational system if they focused on it." Adding more content specific games would not only be beneficial to game developers, but to educators and students alike who would utilize the games in their classrooms. It is possible that teachers and students could help guide the developers through the different kinds of game elements they would like to see in the different content specific digital games. For example, teachers already experts in pedagogy and content could pair their expertise with a game developer who is an expert in game design. This could lead to digital games that push student teamwork, motivation, engagement, and learning to heights previously unimaginable in DGBL. Studies have shown, when DGBL was involved, these outcomes are significant for student's success (Prensky, 2014; Vander Ark, 2012; Whitton, 2014).

Conclusions

DGBL in education has been a well-studied topic over the last 20 years. However, the perception of and use by middle school educators has largely been untouched. DGBL, when incorporated properly has been shown to increase student motivation, student collaboration, and student engagement, which are all important to help increase student retention and knowledge (Habgood & Ainsworth, 2011; Little, 2015; Shah & Foster, 2014). Furthermore, DGBL has been shown, in other countries, to be a valuable tool when teaching today's digital native learners.

In my basic qualitative study, I interviewed eight middle school teachers about their use and perception of DGBL. Participants reported the positive and negative factors that helped or hindered their use of DGBL in the middle school classroom. With more

practice and time using DGBL middle school educators can become more confident and influential DGBL leaders in their school districts. To this end, DGBL in the middle school classroom provides a valuable resource for middle school teachers to bring old content to life in a new engaging way.

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Appendix A: Interview Protocol

Date:

Location:

Participant:

Grade and Subject Taught:

Interview length:

• Thank you for coming today.

• Introduction of facilitator

My name is Spencer Vogt and I am a student at Walden University.

Currently I am a candidate for a Doctorate degree in the Philosophy of Education, specializing in Educational Technology

In case of problems or concerns please do not hesitate to contact Dr. Christine Sorenson, a Walden University representative, at the information provided on your consent form.

• Purpose of the discussion:

The purpose of today's discussion is to better understand how teachers use DGBL in the middle level [school] classroom and their perceptions of the influences on their decisions about use of DGBL.

• Informed consent

You replied, "I consent" to an email to participate in an interview that is expected to last about an hour. After the interview, you will be asked to review the transcript to ensure its accuracy. With your permission, the interview will be audio recoded; no video will be recorded. No personally identifiable information will be shared on audio recordings or notes from the interview. Your identity will not be linked to your responses. That is, I will not report any information that could potentially make you identifiable, like your name or personal characteristics, your school or community. The data I collect will remain confidential. You have the right to review the interview transcript, the material that is collected, and the data that has been gathered as the result of this session. You have the right to withdraw from the study at any time without prejudice. Once the data

have been analyzed I will email you a copy of the results for review and comment. You can choose to leave or not answer any questions asked should you feel uncomfortable at any time during our discussion of your experiences.

• Check for understanding and obtain consent:

Do you have any questions about the informed consent information?

Do I have your consent to proceed with this interview?

• Confirm permission to record the session

To help me in my analysis I would like to record our session.

Myself and the transcriber will be the only people who will access audio-recordings. Transcripts, that do not contain names, will only be available to members involved directly with the research. Instead of names I will use pseudonyms in the transcripts. As I reflect, summarize, and report on what we have discussed, I will never share information that would allow you to be identified.

• Check for Understanding and obtain consent:

Do you have any questions about the intent to record our session?

Do I have your consent to record our session?

• Ground rules:

There are no right or wrong answers—I am interested in your perceptions and experiences. Please let me know if you wish to stop or take a break at any time

• Check for Understanding:

Are there any questions regarding the ground rules that were just shared?

• Questions:

Background information (Questions 1-3)

1) How many years have you been a ___(insert grade level and subject matter) teacher?

2) How did you first learn about digital gaming?

3) How long have you used digital games in your classroom?

RQ1: How DGBL is Used in the Classroom (Questions 4-8)

4) How often do you incorporate digital games into your classroom?

5) What kinds of digital games do you incorporate in your classroom?

    a) Probes: commercial? Apps? Web-based?

6) In what ways do you incorporate digital games in your classroom?

    a) Probes: drill and skill? Role play? Other?

7) What can you tell me about the content areas where you use digital games more often?

8) Overall, describe what your class looks like when using digital games?

RQ 2 and 3: Positive and Negative Influencers (Questions 9 - 15)

9) What are things you like about using digital games in the classroom?

    a) dislike about using digital games in the classroom?

10) What are the benefits you perceive in using digital games in the classroom?

    a) drawbacks you perceive in using digital games in the classroom?

11) Tell me what advantages do you see in using digital games compared to other approaches

    a) What disadvantages do you see in using digital games compared to other approaches?

12) How do you decide which digital games to use?

    a) or not to use?

13) In what ways do you find digital games easy to use in the classroom?

    a) or not easy to use in the classroom?

14) Describe how you experimented with games before using them in the classroom?

15) What results have you observed when using digital games as part of instruction?

Concluding Question

16) Is there anything else you feel important for me to know about digital games in your classroom?

• Wrap-Up:

Thank you for participating in this research study and for giving up your valuable time.

Remember that the thoughts you shared with me today will be used to understand how middle level [school] educators use DGBL in the classroom and what influences their decisions.

Remember that your identity will remain private. What was said during this interview will remain confidential.

<u>Confirm participants contact information</u>

For further contact, questions, and/or concerns please email me at spencer.vogt@waldenu.edu. Remember, I will contact you again, via email, to review your final interview transcripts.

Appendix B: Codes, Categories, and Themes

Coding Schema

Question: How do middle school teachers describe their use of digital game-based learning in the classroom?

Codes	Categories	Themes
reaches different audience student can use anywhere Student participation Education focused deepen understanding promotes student choice Getting students prepared Exposure to computers for those who do not have a home Re-teaching Bartle's Classification of Gamers Ownership provides different learning reaches different population	Reaching different students	To engage students in content/real-world experiences
makes concepts more real real world connections Role playing Give kids experience Students earn gold pieces Warrior, mage, healer use of powers and Leveling easy to engage role-playing Digital citizenship Demonstrate	Making content real	
Physical science Life science Earth science Vocab Literary elements Figurative Language parts of speech grammar language Physics Chemistry MAP skills games for math basics integers Fractions order of operations historical games Oregon Trail	Content specific games	

American Revolution Civil War Ancient Greeks Olympics Ancient civilizations content content based games games depend on content Ancient civilizations content cross curricular purchased with curriculum games allow for content help Content specific games Use with ESL students compared to standards applicable to content use available games allows for more content review		
Create mazes Create roller coasters Create game boards build and create Building and Creating Students create an avatar students create names	Support of creativity	To support creativity and skill building
Mazes/roller coasters Skills targeted games Coding Osmo Coding games students build for review challenging questions thought provoking PBL Students must think	Support of skill building	
Work in teams Allows students to share Whole group whole class games teams team based games build relationships Small group stations Small group	Promotes teamwork	To promote teamwork/communication skills
Promotes teamwork and collaboration Students work Collaboratively Student collaboration Collaborate with peers Collaborate with peers Student collaboration Teacher likes collaboration	Promotes communication skills	

students work independently games for individuals games based on student level individual games student-paced individual based games Student based allows for different learning levels Timed challenges games as homework Mobile learning helps with 1:1 instruction	Promotes individualization	To individualize learning
games provide feedback immediate student feedback games provide feedback Quizizz Quizlet Quizlet Live legends of learning Gravity BBC games Sumdog Prodigy Zondle Kahoot! Socrative Classcraft Boss Battles Battle Boards	For feedback	For feedback/assessment
Test-prep review games Check for learning games as a review reviewing games used for review used as review Used for test review Games to review information Reviewing information end of unit review Quick review Simple assessment Games as assessment formative assessment repetitive games students' game scores matter	For assessment	
controlled environment teacher control easily manageable Manage class environment Block students	Classroom management	For classroom management/to fill time

Fewer discipline issues		
simple reward system games used as reward game used to fill time Used to fill time	Time filler	

Question: What factors do middle school teachers view as positively influencing decisions to integrate digital game-based learning into their classrooms?

Codes	Categories	Themes
teacher experiments on games started in high school teacher experiments with games family helpful teacher experiments watches video clips willingness to learn more uses family to help experiment as a class teacher chats self-taught tech team supports learning game intricacies Teacher experiences game first Family willing to help practice on family past experience Teacher plays first following experts teacher experiments on games Teacher wants to experience game teacher was a gamer Teacher game preference Must look attractive must be user friendly	The teacher experience with games before showing the students	Their positive experiences with digital games
began with PD learn from PD Support and encouragement from others Support from others Encouragement from others See it demonstrated online technology coordinator helps Seeing it demonstrated Experiencing it for self NETA Professional association Learning from others	Encouragement from others	

Experienced it for self Technology department helpful Teacher constant learner support from colleagues Colleagues are helpful Social media willing to help Helpful colleagues Pinterest colleagues willing to share learn from PD PD provided Twitter professional development teachers share information Seeing game demonstrated Tech savvy teachers help		
already set up easy prep don't have to spend a lot of time Saves prep time games collect data sends report ideas already complete data stored easy assessment quick assessment not time consuming when built differentiation of learning collects data minimal instructions needed Data collection Easy to accomplish little pre-teaching good start to class meaningful time filler Easier to use don't have to create new immediate feedback uses data for lesson planning games give data instant feedback Saves info Built-in rules easy to engage Teacher gets notifications easy to use Easier lesson planning data is an advantage	Makes preparation easier	The perception of easier lesson planning and classroom management

quick to update Teacher does less work		
atmosphere change of pace different tool higher energy positive outlook on classroom Students have fun students want to be in class allows for student ownership Less complaining engagement is up cool class Positive environment students connected to class something different mix it up Entertaining students want to review Student involvement Students ask more questions not sit and get students want to learn promotes student choice Improved participation Fewer classroom issues Excited to come to class Encourages involvement Older students helping younger Engages students Revitalized teaching Students know what to expect Same content in new format Humorous Students concerned about game	Positive affect on Classroom environment	
students engaged student engagement Engagement better attention, energy and attitude Student excitement student enjoyment Excitement	Positive change in student engagement	The perception of positive influence on students (engagement, confidence, thinking, behavior)
Students are experts Students are confident Student experts different kids successful positive self-esteem	Positive change in student confidence	

Students are the expert Students get excited to teach students learn from their mistakes helps students feel similar to gen Ed students don't feel singled out Less anxiety		
students aren't aware they are learning Student accountability student interest Students attend better retaining information better Students ask questions increases knowledge level Might increase knowledge increases knowledge Transfer knowledge to other classes Students retain information Students are curious score better on TESTs Students transfer knowledge better achievement over time success on tests better results with essay questions Easier student comprehension Student learning Extend learning outside of class Students are happy	Positive change in student thought	
students take initiative Students working Weekends Students encourage others students stay interested Fewer behavior problems holds students accountable students ready to focus give students hope for success more confidence Improved effort Keep students settled Student learn outside of the classroom willing to practice more often	Positive change in student behavior	

Question: What factors do middle school teachers view as negatively influencing decisions to integrate digital game-based learning into their classrooms?

Codes	Categories	Themes
Network problems Technical difficulties Technology issues Network problems Lose a day when tech down Technology issues Hardware can be a challenge Tech issues Internet is not always reliable internet is out lack of updates disappointing when internet goes down tech issues with the games Games need to be updated	Technical concerns	Technical difficulties
Student account access Lack of access students lack access some lack access blocked by tech department Lack of computer availability games with commercials ads might be inappropriate no pop-up ads or advertisements	Lack of access to digital games	
lack of self-efficacy Lack of self-efficacy Lack of self-efficacy lack of self-efficacy lack of self-efficacy Lack of comfort lack of self-efficacy lack of teacher knowledge Lack of training Lacks self-efficacy lacks self-efficacy Lacks experience lack of confidence Lack of confidence Lack self-efficacy Teacher lacks experience teacher preparedness initially lacked experience tough when student is expert Teacher worry sometimes unsuccessful Can be overwhelming	minimal self-efficacy	Lack of self-efficacy

Classroom management classroom management issues Negative classroom management Hyper students competitive students Digital citizenship concerns human interaction struggles students intentionally miss student messing around students "sabotaging" leader board causes issues students get mad games get loud Loud noise level ability to control students classroom management is tougher other teaching styles suffer Play rather than write Students complain wants to see every screen game dominated by one student non-competitive might dislike Too much competitiveness negative competition competition is both positive and negative competition can be distracting competition is negative	Classroom management concerns	Perception of more difficult classroom management
Not all students interested Loss of attention short attention span attention span might decrease students can disengage Students off task student distraction students want everything to be game	Students are distracted	
students don't show work can't verbalize the process games lack explanation games not available for all content games depend on availability Distract from content Can be frustrating Have to be flexible Too much screen time	Teachers must be flexible	The need for flexibility/a backup plan
always have a backup backup plan backup plan Must have a backup plan	Teachers need a backup plan	

students without device		
Lack of time to try timer can turn off students speed is an issue might be too fast only so much time role-play takes time time consuming setup Time consuming explanations Time consuming investigations time-consuming takes time not enough time	Timing issues	Time constraints

Question: What are the differences in how teachers describe their experiences between those who adopted DGBL within 3 years after they started teaching (innovators), those who adopted DGBL 4-7 years after they started teaching, and those who adopted DGBL 8 or more years after they started teaching.

Adopted DGBL within 3 years after they started teaching (innovator).

Codes	Categories	Themes
RQ1		
student can use anywhere Education focused provides different learning reaches different population	Reaching different students	To engage students in content/real-world experiences
easy to engage role-playing	Making content real	
MAP skills games for math basics integers Fractions order of operations historical games Oregon Trail American Revolution Civil War content based games purchased with curriculum games allow for content help applicable to content use available games	Content specific games	
Skills targeted games challenging questions	Support of skill building	To support skill building
Allows students to share team based games build relationships	Promotes teamwork	To promote teamwork
games based on student level individual based games	Promotes individualization	To individualize learning

helps with 1:1 instruction		
Quizlet Live Sumdog Prodigy Zondle Kahoot! students' game scores matter	For feedback	For feedback
games used as reward game used to fill time	Time filler	To fill time
RQ2		
teacher experiments on games started in high school uses family to help experiment as a class teacher experiments on games Must look attractive	The teacher experience with games before showing the students	Their positive experiences with digital games
teacher chats learn from PD technology coordinator helps Colleagues are helpful x2 Helpful colleagues learn from PD PD provided Twitter professional development teachers share information	Encouragement from others	
already set up game is easily manageable easy prep don't have to spend a lot of time Saves prep time games collect data sends report Easier to use easy to engage easy to use	Makes preparation easier	The perception of easier lesson planning and classroom management
change of pace different tool higher energy positive outlook on classroom Students have fun students want to be in class allows for student ownership	Positive affect on Classroom environment	
student engagement student enjoyment	Positive change in student engagement	The perception of positive influence on students

students learn from their mistakes helps students feel similar to gen Ed students don't feel singled out	Positive change in student confidence	(engagement, confidence, thinking, behavior)
students aren't aware they are learning score better on TESTs Students transfer knowledge better achievement over time success on tests better results with essay questions Extend learning outside of class	Positive change in student thought	
holds students accountable students ready to focus give students hope for success more confidence Student learn outside of the classroom willing to practice more often	Positive change in student behavior	
RQ3		
Technology issues internet is out lack of updates disappointing when internet goes down tech issues with the games	Technical concerns	Technical difficulties
blocked by tech department games with commercials ads might be inappropriate pop-up ads or advertisements	Lack of access to digital games	
initially lacked experience	minimal self-efficacy	Lack of self-efficacy
games get loud ability to control students classroom management is tougher wants to see every screen game dominated by one student negative competition competition is both positive and negative competition can be distracting	Classroom management concerns	Perception of more difficult classroom management
attention span might decrease students want everything to be game	Students are distracted	
students don't show work can't verbalize the process games lack explanation	Teachers must be flexible	The need for flexibility/a backup plan

games not available for all content games depend on availability Have to be flexible		
always have a backup backup plan backup plan students without device	Teachers need a backup plan	
only so much time role-play takes time	Timing issues	Time constraints

Adopted DGBL 4-7 years after they started teaching (early majority).

Codes	Categories	Themes
RQ1		
reaches different audience Student participation deepen understanding Re-teaching	Reaching different students	To engage students in content/real-world experiences
real world connections 4,5	Making content real	
Physical science Life science Earth science Vocab Literary elements Figurative Language parts of speech grammar language Physics Chemistry Content specific games compared to standards allows for more content review	Content specific games	
thought provoking Students must think	Support of skill building	To support skill building
Whole group whole class games teams Small group stations Small group	Promotes teamwork	To promote teamwork/communication skills
Promotes teamwork and collaboration	Promotes communication skills	
games for individuals individual games student-paced allows for different learning levels	Promotes individualization	To individualize learning

games as homework Mobile learning		
games provide feedback immediate student feedback games provide feedback Quizizz 2, 4, 6 Quizlet Quizlet Live 4, 6, 8 legends of learning Gravity BBC games Kahoot!	For feedback	For feedback/assessment
Test-prep review games Check for learning reviewing games used for review used as review Used for test review repetitive games	For assessment	
Used to fill time meaningful time filler	Time filler	To fill time
RQ2		
teacher experiments with games family helpful teacher experiments watches video clips willingness to learn more Teacher experiences game first Family willing to help practice on family past experience Teacher plays first must be user friendly	The teacher experience with games before showing the students	Their positive experiences with digital games
began with PD support from colleagues Social media willing to help Helpful colleagues 4,5,7,8 Pinterest colleagues willing to share Tech savvy teachers help	Encouragement from others	
collects data Data collection Easy to accomplish little pre-teaching good start to class don't have to create new immediate feedback uses data for lesson planning	Makes preparation easier	The perception of easier lesson planning and classroom management

games give data instant feedback Saves info Built-in rules data is an advantage		
something different mix it up Entertaining students want to review Student involvement Students ask more questions not sit and get students want to learn Same content in new format Humorous Students concerned about game	Positive affect on Classroom environment	
students engaged 4, 5, 6 student engagement 3, 4, 6, 7, 8 better attention, energy and attitude Student excitement	Positive change in student engagement	The perception of positive influence on students (engagement, confidence, thinking, behavior)
different kids successful positive self-esteem Students are the expert Students get excited to teach	Positive change in student confidence	
student interest Students attend better retaining information better Students ask questions increases knowledge level Might increase knowledge increases knowledge Students are curious Easier student comprehension Students are happy	Positive change in student thought	
students take initiative students stay interested	Positive change in student behavior	
RQ3		
Tech issues Internet is not always reliable Games need to be updated	Technical concerns	Technical difficulties
Student account access Lack of access students lack access	Lack of access to digital games	
Lack of confidence Lack self-efficacy Teacher lacks experience	minimal self-efficacy	Lack of self-efficacy

Codes	Categories	Themes
teacher preparedness Teacher worry		
Negative classroom management Hyper students competitive students Digital citizenship concerns human interaction struggles students intentionally miss student messing around students "sabotaging" leader board causes issues competition is negative	Classroom management concerns	Perception of more difficult classroom management
students can disengage student distraction Too much screen time	Students are distracted	
Lack of time to try timer can turn off students speed is an issue might be too fast	Timing issues	Time constraints

Adopted DGBL 8 or more years after they started teaching (late majority).

Codes	Categories	Themes
RQ1		
promotes student choice Getting students prepared Exposure to computers for those who do not have one at home Bartle's Classification of Gamers Ownership	Reaching different students	To engage students in content/real-world experiences
makes concepts more real Role playing Give kids experience Students earn gold pieces Warrior, mage, healer use of powers and Leveling Digital citizenship Demonstrate	Making content real	
Ancient Greeks Olympics Ancient civilizations content games depend on content Ancient civilizations content cross curricular Use with ESL students	Content specific games	
Create mazes Create roller coasters	Support of creativity	

Create game boards build and create Building and Creating Students create an avatar students create names		To support creativity and skill building
Coding Osmo Coding games students build for review PBL	Support of skill building	
Work in teams	Promotes teamwork	To promote teamwork/communication skills
Students work Collaboratively Student collaboration Collaborate with peers Collaborate with peers Student collaboration Teacher likes collaboration	Promotes communication skills	
students work independently student-paced Student based Timed challenges Mobile learning	Promotes individualization	To individualize learning
Quizizz Kahoot! 2, 3, 4, 6, 8 Socrative Classcraft Boss Battles Battle Boards simple reward system	For feedback	For feedback/assessment
games as a review Games to review information Reviewing information end of unit review Quick review Simple assessment Games as assessment formative assessment	For assessment	
controlled environment teacher control Manage class environment Block students Fewer discipline issues	Classroom management	For classroom management
RQ2		
self-taught tech team supports learning game intricacies following experts Teacher wants to experience game teacher was a gamer Teacher game preference	The teacher experience with games before showing the students	Their positive experiences with digital games

Support and encouragement from others Support from others Encouragement from others See it demonstrated online Seeing it demonstrated Experiencing it for self NETA Professional association Learning from others Experienced it for self Technology department helpful Teacher constant learner Seeing game demonstrated	Encouragement from others	
ideas already complete data stored easy assessment quick assessment not time consuming when built differentiation of learning minimal instructions needed Teacher gets notifications Easier lesson planning Teacher does less work	Makes preparation easier	The perception of easier lesson planning and classroom management
atmosphere Less complaining engagement is up cool class Positive environment students connected to class promotes student choice Improved participation Fewer classroom issues Excited to come to class Encourages involvement Older students helping younger Engages students Revitalized teaching Students know what to expect	Positive affect on Classroom environment	
student engagement 3, 4, 6, 7, 8 Engagement 2, 3 Student excitement student enjoyment Excitement	Positive change in student engagement	The perception of positive influence on students (engagement, confidence, thinking, behavior)
Students are experts Students are confident	Positive change in student confidence	

Student experts Less anxiety		
Student accountability Transfer knowledge to other classes Students retain information Student learning	Positive change in student thought	
Students working Weekends Students encourage others Fewer behavior problems Improved effort Keep students settled	Positive change in student behavior	
RQ3		
Network problems Technical difficulties Technology issues 2, 3 Network problems Lose a day when tech down Hardware can be a challenge	Technical concerns	Technical difficulties
some lack access Lack of computer availability	Lack of access to digital games	
lack of self-efficacy Lack of self-efficacy Lack of self-efficacy lack of self-efficacy lack of self-efficacy Lack of comfort lack of self-efficacy lack of teacher knowledge Lack of training Lacks self-efficacy lacks self-efficacy Lacks experience lack of confidence tough when student is expert sometimes unsuccessful Can be overwhelming	minimal self-efficacy	Lack of self-efficacy
Classroom management classroom management issues Loud noise level other teaching styles suffer Play rather than write Students complain non-competitive might dislike Too much competitiveness	Classroom management concerns	Perception of more difficult classroom management
Not all students interested Loss of attention Students off task	Students are distracted	
Distract from content Can be frustrating	Teachers must be flexible	

Have to be flexible 2, 3, 7, 8 Must have a backup plan	Teachers need a backup plan	The need for flexibility/a backup plan
time consuming setup Time consuming explanations Time consuming investigations time-consuming takes time not enough time	Timing issues	Time constraints