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The Impact of Game-Based Learning in a Special Education Classroom

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The Impact of Game-Based Learning in a Special Education Classroom

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A Literature Review Presented

in Partial Fulfillment of the Requirements

For the Degree of Master of Education

Dr. Theresa Pedersen

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Abstract

Every school has at least one student who has a learning disability or struggles with academics. Every school also has teachers with the ability to reach out to struggling students, using traditional and nontraditional approach to learning. Game-based learning is a nontraditional approach which introduces students to game-based learning instead of more traditional paper and pencil activities. Multiple researchers have found game-based learning raised test scores, allowed for hands on social skill lessons, and has helped generate a positive environment for students. A few researchers shared the negative impacts of game-based learning, including the lack of transferability of skills for students and the difficulties educators face creating games. The literature review studied the types of game-based learning, positives and negatives of game-based learning in the special education classroom, , and approaches needed to continue research and implementation of game-based learning in schools.

Keywords: Game-based learning, special education, digital games, game design

Introduction

Education is continuously changing, as new approaches emerge to meet the needs of diverse students. One newer approach is game-based learning. Game-based learning is defined as the use of games as a main lesson or the enhancement of a lesson, while keeping learning as the main, desired outcome (Denham, Mayben, & Boman, 2016). There have been studies about game-based learning in the classroom, different types of game-based learning, and how games affect the academic growth of students. For students who have individualized educational plans (IEP), game-based learning is a must to help guide instruction, create a positive environment, and generate academic success. Whyte, Smyth, and Scherff (2015) found students with autism to be more successful and motivated when using computerized games for academic lessons. Students who receive specialized instruction are receiving this instruction due to lack of success with a traditional approach. Jong (2015) used game-based learning through VISOLE (Virtual Interactive Student-Oriented Learning Environment), which positively affected students who are both low and moderate academic learners. Jong (2015) also discussed high-achieving students were not impacted by this non-traditional approach. This statement shows how important a different approach to academics is vital for students who receive specialized education or students who struggle to succeed with a traditional approach.

For students with disabilities to be successful in school, educators need to focus on how a nontraditional approach, such as game-based learning, can create an environment which drives students to work hard and lead students to higher academic success within school. According to author Tamara R. Meredith, the use of games for learning increased student engagement and fostered a “rewarding, fun, and memorable experience” (Meredith, 2016, pg. 496). The purpose of this literature review is to analyze research focused on the implementation of game-based learning

in a special education classroom, the positive and negative impacts of game-based learning on student achievement, and what impact both high and low tech have on student engagement.

Review of the Literature

Traditional vs. Nontraditional Approaches

With the availability of new technology and research, the field of education is constantly shifting approaches. Few classrooms use only traditional approaches, as students learn in a variety of ways. Administrators and educators are constantly looking for new ways to meet the student academic needs. One recent approach involves the use of games. There are two approaches to game use in education today: Game-based learning and gamification. It is important to note the difference between the two approaches. Gamification focuses on rewarding students for completion of work, while game-based learning enhances the lessons using conflict and play to make academics more engaging and fun for students (Plass et al., 2015). The focus of this review is game-based learning.

Game-based learning uses games, electronic and non-electronic, to enhance instruction in a contemporary way in hopes of engaging more students. Research states students drop out of school because of a lack motivation and engagement in learning (Khan et al., 2017). Another reason behind new approaches being relatable to students now is due to students wanting and needing to know the ‘why’ behind content, not just for a test (Al Azzawi et al., 2016). Further along in Al-Azzawi, Al-Felita, and Al-Blushi’s (2016) research, the team discusses the importance of using technology and games to go past academics and prepare for twenty-first century skills, which a student may not get with a traditional approach. Researchers are requesting educators to move away from teaching for a test and toward an approach which focuses on student success beyond an exam.

New teaching strategies not only include framework from past approaches but take old approaches, mix them with new technologies and findings to continue to grow the education system and motivate students. Khan, Farzana, and Malik (2017) found students at a secondary level were more engaged and motivated in school with a nontraditional approach, specifically females even more than males were engaged in learning through this new approach. Rather than focusing on a textbook or teaching from a test, educators are moving toward a game-based approach. Game-based learning has been around for a couple decades. It was a hot topic in the early 2000s but has been on a rollercoaster since becoming a trending subject in education (Holmes & Gee, 2016). However, some researchers are uncertain as to why educational practitioners have not taken advantage of game-based learning. Denham, Mayben, and Boman (2016) found the characteristics of games are ideal for students to learn, due to being actively engaged with their learning. Denham, Mayben, and Boman (2016) continued to report even though research continues to point to positive effects for students, concerns from educators are due to the lack of preparation and coaching needed before implementing a game-based learning experience.

There has been growth in the area of implementation of game-based learning in the classroom, especially with young adults. According to Education and Information Technologies, the use of game-based learning goes beyond an elementary level, but the number of educators who use game-based learning with older students is nearly one-third of elementary educators. Khan, Farzana, and Malik (2017) focused on the outcomes of game-based learning with young adults at the secondary level, which revealed only 25.2% of teachers use game-based learning in high-school with 60.6% of teachers at the elementary level using game-based learning (pg. 2769). This discrepancy between these two statistics shows the different levels in education prioritize different approaches with their students. Game-based learning, however, has broken into education with

high recommendations, so much even collegiate level professors in support of game-based learning use it with their students (Holmes & Gee, 2016).

Types of Game-Based Learning

Before research about different types of game-based learning, it is important to know what definition of game-based learning is being used. For this section, the definition of game-based learning is any game which is being used for a specific learning outcome (Plass et al., 2015). Game-based learning is evolving every day, which is why it is important to note the different types of gaming platforms, which includes, but not limited to: computer games, board or card games, games played with cards, or movement games. Game-based learning has many categories, but this section will focus on three specific types of games: kinetic, electronic, and analog games.

Kinetic educational games use movement, where traditional games are more stationary. Some types of kinetic-educational games may be played on a Wii or SMART board, which detects the movement of students. Research on kinetic-based games is slim, but the findings are notable, especially for students who have a disability. Kosmas, Ioane, and Retails (2018) studied the effects of game-based learning on students diagnosed with attention deficit hyperactivity disorder (ADHD). Throughout this research, Kosmas, Ioane, and Retails (2018) found children with ADHD who used kinetic-based educational games showed improvement with their academic and self-regulation skills. Having the connection between movement and academics showed a positive correlation. This researcher did not stop here, though. Following work with students with ADHD, the studies continued to students who were diagnosed with autism. The researcher found students with autism who played kinetic-based games over a two-and-a-half-month time frame also revealed the students' attentions were enhanced (Kosmas et al., 2018). This research was a small

sample of the big impact game-based learning through kinetic-based educational games can have for students with disabilities.

Another form of games used for game-based learning are digital games. Digital games use “various game features, such as fantasy, rules, goals, sensory stimuli, challenge, mystery, and control” to assist with motivating students to learn in the school setting (Ronimus et al., 2019). There is controversy about knowing if or when technology is used too much, especially with adolescent age students. However, video games for an educational purpose have shown to be a great success, if a game is created appropriately. Al-Azzawi, Al-Felita, and Al-Blushi’s (2016) found video games are not only used to help motivate students but were a great way focus on a specific skill. Video games can be and are used in all academic areas and social/behavior lessons, too. Video games allow students to create characters and learn through an alternate world. Students not only learn from the content of the game, but also learn from the structure of the game, such as rules and challenges are presented during a video game.

The final type of game being discussed is an analog game, or more simply put, a board or card game. An educator can use classic board games, such as Pay Day or Racko, to work on academic skills, such as money literacy and number sense. By incorporating a board game or card game into a lesson, students are working on social skills by learning to play with others while working on their academics through games. Overall, all three types of games can be a positive way for students to learn. There is not a right type of game to implement when adding a game-based learning approach into the classroom.

Positives of Game-Based Learning

Research shows multiple positive outcomes from game-based learning within a classroom. The two main findings from research involve attention and adaptability. Plass, Homer, and Kinzer (2015) discussed the importance of adaptable games. Adaptable games adjusted to learner's knowledge, emotions, and other variables to enhance their learning experience (Plass et al., 2015). Game-based learning has a way to draw students into their learning and keep their attention. Not only have researchers seen an increase in the amount of time students stay focused on their work (Denham et al., 2016; Wajjuhullah et al., 2018; Al Azzawi et al., 2016), but students are also showing a positive attitude in class (Khan et al., 2017).

One reason a student was staying actively engaged in their work is due to the adaptability of games during game-based learning (Denham et al., 2016; Craig et al., 2016; Shi & Shih, 2015; Plass et al., 2015). Game-based learning continues to prove, through research, how beneficial it can be when appropriately used within a classroom. Game-based learning endorses a positive outlook on school, helps students become independent learners, and promotes critical thinking, all while working on social skills (Khan et al., 2017). Beyond adaptability and attention catching, game-based learning fosters positive social interactions, develops 21st century skills, and improves academic scores.

Promoting positive social interactions happen two ways through game-based learning: from social or behavioral lessons and through play. First, educators are able to use game-based learning to create games for students to participate in focusing on social skills training. Craig, Brown, Upright, and DE Rosier (2016) focused on the introduction of ZooU, an online, social skills game which can be used across the world. It is important to note this specific study focused on social skills training online, so the researchers could reach out to several students

instead of focusing on one school or district. This article also proves game-based learning, specifically online, could create a uniform practice for all virtual learners, while continuing to adapt to students' specific needs at the same time.

Apart from using game-based learning for social skill lessons, game-based learning promotes positive social interactions through play. When giving students a game to play, the students were not only focused on the academics being taught, but also emphasize how to work together, foster valuable competition, and motivates students to communicate with one another. These skills directly correlated to the 21st century core standards, which focus on employability skills, political science-civic literacy, financial literacy, health literacy, and technology literacy (Iowa Core, n.d.). The main 21st century core standard focused on employability skills. Shi and Shih (2015) researched the elements needed to create games for game-based learning. They found digital games improve problem solving skills, strategic thinking, adaptability to change, and how to use resources (Shi & Shih, 2015). When students are given games to play with others, they focus on how to work with one another, how to self-regulate their emotions, and how to work toward an end goal.

One skill usually difficult to teach students is how to lose with grace and to know failing is okay. This could be a social skill a student grasped while using game-based learning in the classroom. Plass, Homer, and Kinzer (2015) discuss how failure is part of game-based learning. Students are able to learn about failure through an experience rather than through a scenario or description given by an educator (Plass et al., 2015). Game-based learning is a central way for students to begin learning how to cope with their feelings and self-regulate. When students are presented with a traditional approach, they are not given these opportunities to work with others and gain an understanding of how they feel. Social lessons are taught during the school day, but

with game-based learning, they are embedded throughout each lesson creating a greater learning outcome.

Social interactions are not the only skills occurring when using game-based learning within the classroom. There is a direct correlation to academic scores heightening through game-based learning, especially for struggling students. Students with disabilities have a more difficult time connecting with traditional approaches, as discussed before, which is why game-based learning can help alleviate some of the labor students feel from academics (Rominus, 2019). Researchers found another direct correlation between higher academic outcomes using game-based learning (Spires, 2015; Hamari et al., 2015; El Mawas et al., 2019). In the area of mathematics, specifically division and multiplication, students who were in the experimental group played games focused on multiplication and division while the control group was taught with a traditional approach. At the end of the experiment, the experimental group had higher assessment scores than those of the control group (Bakker et al., 2016).

Overall, the positives of game-based learning are apparent. When using game-based learning, educators are able to hold the attention of students, create an interest in the task at hand, and improve student's confidence, especially students with disabilities, as Wajihullah, Ashraf, and Majad (2018) found during their study about students with intellectual disabilities and number sense. This team of researchers found a direct, positive correlation between the use of games for learning and academic achievement in the area of number sense for students with disabilities (Wajihullah et al., 2018). The direct correlation between students achieving higher scores in academic areas and learning how to become respectable employees through social skills learned shows the importance of an engaging, adaptable teaching approach, such as game-based learning.

Implications of Game-Based Learning

Not all research shows only positive results from game-based learning, which is why game-based learning has not been implemented by the educational world. Denham, Mayben, and Boman (2016) discuss the many factors of why game-based learning has not been adopted by all of the educators, yet, which is due to “inconsistent empirical evidence, time constraints, limited resources, stigma associated with ‘play’, methodological flaws in empirical studies on games, and the lack of evidence-based best practices for the integration of games within the classroom” (pg. 70). There is not an approach in education which does not include implications. For this review, there will be a focus on two specific implications were discussed within several of the research articles: lack of knowledge on game-design and transferability of skills learned through game-based learning.

When preparing to use game-based learning within the classroom, the educator needs to begin by knowing how to create games which work on required skills needing to be taught. If a game is not created to a standard, which students will be engaged in while still learning, then the game is being used for little to no reason. It is important to remember while creating a game, it should be entertaining and support the focus of the academics being taught, which Ronimus Eklund, Pesu, and Lyytinen (2019) found during their case-study about second graders who struggle with reading, but improved when the teacher created an intervention using game-based learning. There were several different thoughts of what every game needed, such as: mechanics, visual aesthetics, interaction, freedom, decision making, problem solving, and so forth (Shi & Shih, 2015; Plass et al., 2015; Ronimus, 2019). Along with game-design, educators need to be aware of how much a student knows about technology before introducing game-based learning or how much a student enjoys interacting with others (Lu & Lien, 2020). If a student does not find joy while

interacting with others through games or has lack of knowledge in the area of technology, using game-based learning may not be the right intervention.

In a study about students with dyslexia, researchers examined how game-based learning affected these specific students. Throughout the trial, researchers were hopeful and correct about students with dyslexia showing gains in reading skills but were unable to prove students were able to transfer their new reading skills to other parts of their education, such as spelling and writing (Ronimus, et al., 2019). Overall, these skills relate back to lack of knowledge in game design or improper use of game-based learning. Whatever the reason for implications of game-based learning, it is important to recognize game-based learning is not a magic solution for all learning difficulties (Holmes & Gee, 2016).

Impact on Teachers and Students

Before teachers are able to appropriately begin using game-based learning within their classroom, they need to begin by understanding how and why game-based learning works. Meredith (2018) points out how teachers cannot be expected to have open arms about game-based learning if they are not confident in their own technology or gaming abilities for the enhancement of learning. Not only do teachers have to work on understanding what a game is and how it is best used, which has differing definitions and blueprints from various researchers, but educators also need to be able to learn how to incorporate their current lessons with games (Shi & Shih, 2015; Plass et al., 2015). Teachers work hard to plan lessons for their students; adding technology along with the learning materials can add extra stress and difficulty for teachers (Shi & Shih, 2015). Using game-based learning is not going to be an easy feat for educators, but the impact on students makes the difficulty of creating game-based learning worth it. Higher levels of engagement and

increased levels of challenge during games proved another study to come out with a positive correlation of game-based learning and student outcomes (Hamari et al., 2015).

Students are now able to go to school, know they are going to find joy from learning through interactive games, and increase their academia. Game-based learning does not just happen in the basic subjects of math and reading, but it can be used throughout every subject. This example from a research study by El Mawas, Bratz, Caravan, and Munteanu (2019) discusses how students were able to improve their test scores in science while having fun playing games through a game about the solar system. Other key findings have found the skills learned through game-based learning go above and beyond school itself, such as Spires' (2015) researched. Spires (2015) is a mother who researched the importance of digital games to decide if game-based learning truly taught her son, which she found her child not only learned academics through game-based learning, but game-based learning also enhanced his problem-solving skills and adaptation to change.

These findings show how impactful game-based learning can be, but when thinking about the original question of this review, how does game-based learning impact students with disabilities? A study involving high school boys who were reading two years below grade level showed amazing growth following the implementation of game-based learning. These boys began reading at or above grade level due to the amount of motivation they had while playing a game rather than reading off of a piece of paper (Spires, 2015). There was also a study about students with dyslexia, as mentioned before, who showed great growth in their reading abilities when a traditional approach did not work for them (Ronimus, 2019). The amount of work needed to prepare game-based learning is high for educators, but the amount of learning coming from game-based learning is also intensified.

Future Research

The research about game-based learning is still limited. Game-based learning has shown unbelievably positive results as well as various implications, but more research continues to need to be done and needs to be done at a higher level: “these articles as well as most of the other literature reviewed suffer from the same limitation – extremely small sample sizes” (Meredith, 2018, pg. 499). From the articles, there were several had less than 200 participants within the studies (Wajjuhullah et al., 2018; Hamari et al., 2016; Lu & Lien, 2020); and some studies had under 50 participants (Kosmas et al., 2018; El Mawas et al., 2019; Ronimus, 2019). The larger sample sizes are able to be reached will give a greater understanding of the impact on students when using a game-based learning approach.

Another implication needing to be resolved is the lack of studies for diverse students. Little research exists about the impact of game-based learning on people of a variety of genders, racial groups, and learners. One study about gender found that game-based learning powerfully engages female players more than males, but there was a lack of correlation between game-based learning and academic achievement regarding gender (Khan & Malik, 2017). As for racial groups, researchers found the perception of games can affect the outcome of game-based learning. Hammer and Davison (2017) researched the effects of game-based learning on different racial groups and found 52% of Hispanic Americans believed video games cause violence and 19% of African Americans believe games promote teamwork and problem-solving skills, but this is just one small study about game-based learning and racial groups. Students of different learning levels also are impacted by game-based learning in different ways. One study stated students who were higher learners got less from game-based learning than students who are moderate or struggling learners

(Jong, 2015). There is basic information available about game-based learning and the impact, but more needs to be done.

As far as implications within a school setting, some items need to be taken care of first. Prior to using game-based learning, educators should be taught how to use certain game design framework to help form games creating positive learning outcomes. Educators should also play these games prior to having students play the games to have a better understanding of what the students are doing and why. Two other important concepts prior to using game-based learning in a classroom include preaching students with disabilities how to appropriately use technology for digital games and training for the teachers on technology and digital gaming (Wajihullah et al., 2018). There are teachers who are using game-based learning already. However, more teachers can continue to get on board with a new approach to reach all students, especially those who do not learn as well from a traditional approach.

Conclusion

All students are being provided with an education, but with differing learning styles, students are not always getting the instruction fits best. One way to enhance instruction for all learners is through the use of game-based learning. Game-based learning has shown multiple positive outcomes, such as academic success, social and behavioral growth, and acquiring 21st century skills. Game-based learning also has some implications needing to be addressed, such as transferability of skills and lack of knowledge with game-design. Overall, the success of students speaks for itself about proper implementation of game-based learning. Games have the adaptability to scaffold learning while engaging students in their academics for a long period of time (Hamari et al., 2015).

Students with disabilities or struggling learners have had the most success with game-based learning. For examples, students with intellectual disabilities used digital games to enhance their knowledge of number concepts within one study (Wajiuhullah et al., 2018). The use of technology with game-based learning has been a major factor in the enhancement of game-based learning in the classroom. Technology can be a tool to enhance academics, especially for those with learning disabilities (El Mawas et al., 2019). Students with disabilities need repetition and succeed from new learning approaches rather than traditional approaches. Students who struggle in school also need more motivation to keep going and working hard, which can be difficult if the topic is already hard for students. One way to help motivate students is through game-based learning. Saraiki and Morula's (2013) say it best: "The need of generating new motivational strategies and learning methods in special education is constant and digital games provide a motivational tool with a potential to enrich the learning process" (pg. 11). Every student has a specific learning style and one way we can meet a greater number of students is through game-based learning.

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