

The Question of Digital Game Based Learning: The Potential Perils and Promises of Education's
Golden Goose.

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Date of degree award: December 2016

A capstone project submitted to the Department of Education and Human Development of The
College at Brockport, State University of New York in partial fulfillment of the requirements for
the degree of Master of Science in Education

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Abstract

This paper seeks to explore the recent research around digital game based learning (DGBL) and the K-12 classroom. Through an analytical review of the literature, this paper explores relationships between extant professional literature and empirical research, as well as examining common themes found through the exploration. There seems to be a dearth between the anecdotal literature advocating the use of DGBL in the classroom and empirical research to support its actual effect. This study looks at four different research articles written between 2010 and 2015 in order to find out if there is empirical evidence that supports the use of DGBL in the classroom, K-12. Findings point to some support for the potential benefits of DGBL, although research is still limited. Conclusions drawn include avenues for further study, and implications for teaching and learning.

Keywords: digital game based learning, gamif, video games, learning, education

Introduction

Our world is changing rapidly, and technology is an integral part of that. In the last decade, we have seen an explosion of new technologies and digital tools, from the Internet to cellular devices. Video games, which come in a vast array of complex forms, have quickly become a multi-billion dollar industry as well as an ingrained cultural phenomenon. Since the creation of *Pong* (1972), the first game to make television “interactive” (Zimmerman, 2003), individuals have been transformed from spectators into active players who have been pulled into new experiences and worlds: growing and changing exponentially since then. Video games have expanded to include console games (played via a console device hooked up to a larger screen or TV), PC games that are played directly on a computer, and even social media games which are linked to Facebook or other such accounts (Farber, 2015). All of these games are highly accessible, with almost limitless options, programs and ways to play. Lightning speed advances in technology have created space for an increasingly “gamified” world (Cimbricz, Stoll, & Wilkens, 2014).

Video games and their potential learning benefits have become a topic of heated discussion in the world of education within the last decade. Theorists and practitioners alike recognize the vast impact that video games have on the students that sit in classrooms across the country (Gee, 2007; Farber, 2015; Squire, 2011; Devlin; 2011; Alexander, Eaton & Egan, 2010). There has been a developing body of literature dedicated to exploring ways that video games and their elements could potentially be leveraged in order to support learning in the classroom environment. From where does this line of thinking stem? Although video games have been a

part of our world for over forty years now, the core idea that is built into all of them is the notion of learning through play.

Learning through play as a concept is not new. To play is to “engage in activity for fun or enjoyment; to take part in” according to the Merriam-Webster dictionary. Play is the “work of children” when they are very young, and continues to be central to the learning process throughout development. Researchers and educators agree: the notion of play in a school setting is often seen as secondary or even distracting to the main event of learning content (Farber, 2014; Gee, 2007). However, the extensive writings of John Piaget, Lee Vygotsky, Maria Montessori and others demonstrates to us that play is in fact absolutely integral to a child’s development. Piaget’s theory of constructivism exemplifies the importance of “learning by doing” or actively participating. He derived this theory from thousands of hours observing children at play; actively engaged in learning through what he called practice games. Playing games is a way for children to actively engage in the world around them through symbolic practice (Piaget, 1965). Montessori (1936) emphasizes the importance and joy in learning through discovery; something that can only be achieved through play. Hockney (2013) confirms: “Children need the freedom and time to play. Play is not a luxury. Play is a necessity.” While the research available on learning through play abounds (a subject far too broad to disseminate in this particular paper), anyone who knows a child knows that play is the means that they use to explore their world.

Play is situated in the context of games (Zimmerman, 2003). People play games, although play itself is not always structured as a game with rules and limitations. Piaget (1965) for example, emphasized the playing of games as a way to assimilate information and to learn cultural norms. Vygotsky (1932) wrote that “games are the natural form of work in children, a

form of activity which is inherent to the child, in preparation for his life in the future” (p. 93). More recently (2014), Gray points out that play is “hardwired into our genetic code” and that limiting play can seriously damage a person’s development in the long run (p.73). As children play, they participate in a series of games, both alone and with others, that serve as learning spaces for their development. Playing games as learning has been quite well established and robustly proven over the past few decades (Farber, 2015; Squire, 2011). However, the newer trend of playing in and through digital mediums and technology has exploded much faster than the educational community can keep up with. Video games and other digital mediums are essentially contexts in which play is happening *today*.

As video games have become more easily accessed and integrated into our daily life, scholars in the field of education have begun to explore their potential perils as well as promises for instruction and learning. Because of the relative novelty of what some call digital game based learning, or DGBL (Joung & Byun, 2014), there has been a growing body of literature which touts its merits. Digital game based learning is *essentially any situation in which digital games are leveraged to support learning* (Joung & Byun, 2014). For the purposes of this paper, I will use the term DGBL. Unfortunately, there exists a noticeable gap between the abundance of literature written, and any real empirical research studies to support its effective implementation in the K-12 classroom. Due to this disparity, it is difficult to determine the actual impact DGBL holds for learning in the K-12 classroom. Critics argue that this form of play for today is just entertainment (Alexander et al, 2010). Advocates, on the other hand, say that leveraging video games for learning, or DGBL, has the potential to bring about meaningful learning experiences for today’s students (Gee, 2007; Devlin, 2011; Farber, 2015; Squire, 2011; McGonigal, 2011).

The current discussion around gamification and DGBL remains largely advocacy and the anecdotal. There have been a growing number of books written about classroom experiences and observations of students that say DGBL holds promise for our educational system. Each book comes at the discussion from a different perspective. All of them contain a good deal of personal observations and opinion about the advantages of leveraging DGBL. While these ideas hold merit and weight, they are lacking in methodical process. That is, most of what is suggested around gamification and DGBL is not yet research proven (Shanahan, 2008). Moreover, little is known about the actual effect that digital game based learning holds for student learning, K-12. With this in mind, this paper seeks to: 1) explore the relationships between the extant literature and empirical research around DGBL, K-12, and 2) identify themes that emerge from this examination.

Literature Review

It is seemingly common-sensical that there is a growing body of literature focusing on the potential promises and merits of digital games for use in the classroom. In this section, I discuss what is currently suggested about DGBL.

Many books, articles, talks, and more promote leveraging video games for learning in the classroom, based on personal experiences and observations. These sources demonstrate a growing interest in studying the learning principles that can be gleaned from video games in an attempt to make academic learning in the classroom environment more meaningful, engaging, and productive for today's students (Gee, 2007; Squire, 2011; Farber 2014; Devlin, 2013). Squire (2011) substantiates the importance of the push to understand more about video games, saying "anytime we turn a child off to learning rather than awakening their intellectual curiosity, we've failed...in a digital, participatory age, awakening the students' interests and curiosity and

empowering them to pursue them may be what constitutes a “basic” education” (p. 15).

Alexander, Eaton & Egan (2010) say that there are three major approaches to DGBL that have emerged in the literature over the last decade, including the separatist approach, the integrative approach, and the transfer of learning approach. Advocates of DGBL generally utilize one or more of the three categories when it comes to their argument for its use in the classroom. Using these three approaches, in the next section I will disseminate what they look like across extant literature.

Separatist Approach. The separatist approach “focuses on the skills and the abilities that players acquire—abilities such as analysis, deduction, discrimination and rule following—simply by engaging with electronic games” (Alexander et al., 2010). This approach argues that playing video games in and of itself is a meaningful learning experience, and that learning principles can be derived from such games in order to foster a paradigm shift in the way educators view teaching and learning (Gee, 2007). That is to say, video games are much more than just entertainment. Jane McGonigal (2011) confirms that “reality is broken” and that video games are improving our lives; turning today’s gamer students into expert collaborators, problem solvers, and world changers. By entering into game spaces, the next generation is simultaneously developing and learning a new literacy in a new context (Gee, 2007), and in so doing, the way that they experience the world is different than the generation before them. Video games contain what Gee (2007) calls, *semiotic domains*, or contexts in which different signs can take on different meanings. Proponents argue that the active participation in the semiotic domains of video games stimulates development of a variety of thinking skills as well as multiple literacies, which can be useful when transferred to the classroom (Gee 2007; McGonigal, 2011). In this way, the separatist approach to the study of video gaming and learning push the idea of the

variety of skills and knowledge learned from the process of game play itself (Alexander, Eaton & Egan, 2010).

Critics of the separatist approach to using video games for learning counter that it has been a long accepted fact that children can learn skills and knowledge through game play in the real world (i.e. games such as hide and seek or chess), and wonder why educators should place such a high premium on video games as a sole focus for learning (Alexander et al, 2010).

Though supporters of the separatist approach applaud the metacognitive benefits of video game play, there is little empirical evidence to show how it has an actual effect on learning, or how learning within video games may transfer to more formal academic settings (Alexander et al, 2010).

The Integrative Approach. The integrative approach to DGBL focuses on using digital games to teach specific curricular content (Alexander et al, 2010). There have been a variety of examples of teachers using video games to support specific content objectives, whether it is because a commercial game matches the topic, commercial games being used as a template to insert curricular content, or even games specifically designed for a certain curriculum or curricular area. This category comes as a response to the use of digital games simply as extrinsic motivators for tedious tasks or drills. Proponents of the integrated approach say that teachers can use video games tied together with academic learning in order to create a richer learning experience for students, what some call *educational games* (Squire, 2011; Farber, 2015; Devlin, 2011). Squire (2011) says that for an educational game to be considered beneficial, it must achieve many different things; including employing academic knowledge as a tool for meeting goals, offering multiple ways to play (to contribute to differentiation), piquing players interest, offering spaces for players to interact socially and to view their world in new ways, inspiring

creativity and making “smooth ramps to usher players from being users to producers” (p. 36). Essentially, advocates of the integrative approach to DGBL say that video games and curriculum can be tied together in order to achieve a better result.

On the other hand, skeptics of the integrative approach argue that there is a very apparent lack of empirical evidence to support that educational games are producing learning objectives in the classroom. There is a danger of digital games either subverting the given educational objectives with game objectives, or not having much benefit at all (Hanus & Fox, 2009; Seaborn, 2007). Not enough is yet known about the actual effect of digital games on learning outcomes to prove that it is in fact the best way to go (Alexander et al, 2010; Dominguez, 2013).

The Transfer of Learning Approach. In the transfer of learning approach to DGBL, “the aim is to analyze what it is about electronic games that makes them engaging and then abstract those principals and apply them to structuring the content of the curriculum to make it engaging in a new way” (p. 1839). *(As a side note, this approach seems to have a correlation with gamification, which is essentially the use of game elements in any non-game context in order to derive a more engaging outcome (Zichermann, 2012). Of course, gamification is also a relatively new term, and has been used most extensively in the world of business. Still, proponents of the use of DGBL in the classroom are generally the same individuals who are saying that gamification has the same potential (Squire, 2011; Farber, 2015). The two areas of study are closely related, and in many cases are mentioned in the same literature.)* Getting back to the third approach, what can be called the “transfer of learning”, Alexander et al. (2010) describe key features of digital games that learners have been observed to enjoy; such as narrative structure, heroic human qualities of characters, vivid images, emotional engagement, extreme/exotic events and locations, binary conflicts and structure, as well as role playing (p.

1840). They argue that educators can look at these features of video games, and learn about how they successfully engage the learner in order to transfer that understanding into redesigning the traditional educational material (p. 1841). Farber (2015) more recently argued that in order for digital games to be used such a way, teachers must be much more aware and engaged in the idea of their use in the classroom. He went on to say that there must be teacher demand as well as professional development around the process and development of DGBL tools in the classroom (p. 24). Again, critics argue that this is not yet possible because of the dearth in empirical studies supporting actual effect or any benefits of DGBL in the K-12 classroom (Dominguez, 2013). Much more research is needed in this area, which is an idea that most proponents of DGBL also reluctantly seem to agree on (Gee, 2007; Squire, 2011).

There is a lot of literature around the perceived benefits of DGBL in the K-12 classroom which is largely made up of anecdotal information. That is to say, almost every book dedicated to the potential use of video games as a tool for learning is written from the author's own experience or observations in limited K-12 classroom settings. Although anecdotal literature does contribute to the discussion and includes observations, those observations have not been methodically collected (Cimbricz, 2014). *This is where the separation between the anecdotal literature and the empirical research lies.* There continues to be a large gap between these two areas of discussion about DGBL. Proponents of the use of video games in the K-12 classroom are talking a big game about their benefits, but where's the beef? In the findings section, I seek to examine the available empirical research, and what it says about DGBL in the K-12 classroom.

Method

The search began by delving into several large research databases, including EBSCOHost, Google Scholar and ERIC (Educational Resources Information Center). Searching

the term *gamification* yielded a large and complex range of sources found. A more focused search was therefore needed to tease out research around digital game based learning and its effects on K-12 education. I then used combinations of “video game”, “gamif”, “digital games” and “digital game based learning” with the term “K-12 education” for the initial information retrieval. The term “gamif” was used to cover any terms such as gamified, gamify or gamification within the search. This search produced 453 possible sources.

In the first stage of my data selection, the following criteria were applied: the study needed to be 1) available as full text online 2) published in a scholarly and peer-reviewed journal 3) published between January 2010 and September 2015. A smaller window of time was placed as a limitation on the search due to the fact that technology has been changing at such a rapid rate. Thus, the studies needed to be the most current to reflect current technologies and advancements. Applying these limitations reduced the number of studies to 32 in total.

In the second phase of data selection, the title and abstract of each study were reviewed using a second set of screening criteria, specifically: 1) the study should have some kind of empirical data (whether qualitative or quantitative), 2) the study focuses on using digital games for an instructional or learning purpose, and 3) the study’s participants are students in a K-12 classroom setting. After the second stage of review, only four studies met these criteria.

Examining these four studies for current research trends in the use of digital games and their actual effects on learning uncovered the following six areas of interest: 1) dearth of studies available, 2) research method, 3) grade level of participants, 4) expertise of authors, 5) goal of research, and 6) terms used related to digital games and learning.

Findings/Discussion

Dearth of studies available: The most prominent finding is that the number of empirical research studies that met the two levels of criteria given was extremely small. Of an initial 453 sources, only four were published in peer-reviewed scholarly journals within the last five years, contained empirical data of some sort, used digital games as a way to support learning, and involved participants in a K-12 setting. This finding confirms what almost every book and article has already stated: More research is needed in this area. Both anecdotal literature and empirical research agree on this point.

Research Method: 100% of the studies used some form of methodically collected qualitative data, including observations, interviews, and surveys. Of the four studies found, only one contained quantitative data. The remaining three sources included methodically collected qualitative data from observations and surveys. Anecdotal sources, which appear to contain qualitative data but lack in methodical process, relied heavily on observations and interviews. Unfortunately, the observations in these sources were not conducted in a methodical manner that scholarly research requires. That is to say, although there is a large number of anecdotal and advocacy sources available, none of them are grounded in empirical research. Conversely, the empirical studies that have been written in the past five years to show the actual effects of DGBL are few in number.

Grade level of participants: Three of the four studies had secondary students (Grades 9-12) as participants. The fourth study included a mixture of students from several age groups, including a small sampling of preschoolers, second graders, fifth graders, and a few tenth and eleventh grade students. While all four studies included high school age participants (Grades 9-12), there were zero studies that investigated elementary students (Grades K-6) exclusively. The lack of

studies found may be due in part to the narrow time constraints placed on the search: only studies between 2010 and 2015 were accepted. Also, none of the empirical studies included any participants who were in grades 6-8, or middle school. In comparison, the anecdotal literature had a similarly notable focus on students in secondary grades (9-12). The focus on high school students as participants may be due to the fact that they are older and generally able to articulate their thinking in words, making their understandings and perceptions of digital game based learning more easily accessible by researchers. Another possible reason for the high percentage of high school aged participants is the increasing popularity in the development “21st century skills” to prepare students for the real world, including the mastery of digital technologies.

Expertise of authors: The authors’ areas of expertise areas also varied widely. Authors of the four studies reviewed included educators, graduate students, STEM learning researchers and scientists. There was a notable focus in interdisciplinary connections between two or more areas of research, that is, three of the four studies involved collaboration across multiple disciplines. For example, Ernst & Clark (2012) combined the expertise of researchers in the field of STEM (Science, Technology, Engineering, and Mathematics) learning, high school educators, and graduate level game designers in order to reach their research objectives. Because of the complexity of digital game based learning, it seems that collaboration across disciplines was helpful for researchers to understand their findings. The anecdotal literature is similarly written by a host of authors from different fields of study, including educators, game designers, literacy experts, and business people to name a few.

Goal of the research: When the goal of the research studies was considered, three of four studies focused on using DGBL to support “21st century skills” or “career awareness.” Two studies focused on learning objectives in the STEM curriculum. One study focused on using

video games, specifically Minecraft™, to support learning in a visual art classroom.

Incorporating 21st century skills into the classroom using DGBL makes sense, as one of the hallmarks of 21st century skills is an understanding of technology and how it works in the real world (Annetta et al, 2010). The finding that several studies focused on STEM learning was interesting, but makes sense because technology is a major part of that curriculum. It follows that DGBL would support STEM learning in a productive way. With technology being an integral part of STEM curriculum, advances in technology would be noted and explored perhaps more quickly than it would in an ELA curriculum for example. As for the use of Minecraft™ in the arts curriculum, there are many different tie-ins that the researchers found between the two, including the learning of aesthetic experiences and the design process.

Terms Used: There was a pattern when it came to the use of terminology around DGBL: essentially, no two sources were alike. Every source seemed to use a different combination of terms in their writing. One of four studies used the term “video game” and some form of “video games for learning.” Three of the four studies mentioned “gaming” or “educational gaming.” Only one of the four studies used the term DGBL. Lastly, all of the four studies included other terms in addition to the terms already mentioned. Basically, even within individual studies, different terms are used for the same things (video games and digital games for example) and no two researchers seem to agree on a particular term or terms that is a best fit for the area of study. One possible reason for this disparity may be the fact that digital gaming has changed so quickly and drastically over the past decade, it has proven difficult for research to keep up or land on any one term. Another reason may be linked to the difference in expertise of the researchers. Scholars with different backgrounds may associate words in different ways, leading to divergent

terminology. Patterns noticed among these codes led to bigger themes that are discussed in detail in the next section.

Emerging Themes

Lack of quantitative empirical support. Only one of the studies reviewed in this paper used *quantitative* data methods, and the results were worth noting. A study by Ernst & Clark (2012) focused on developing various computer-based multimedia materials and game design software that were tested in an online field course for high school seniors. The purpose of the study was to evaluate student learning gains in content specific computer science areas and also to find out more about student's overall appreciation of technology used. They found that the use of computer gaming software contributed to student's attainment of computer science content objectives overall. However, according to the quantitative assessment data, there was a high variance of scores across all students. Their hypothesis was “: the use of gaming as an instructional tool will result in attainment of computer science proficiency (p. 42).” The actual scores and the variance between them contributed to the rejection of this hypothesis. Essentially, the use of computer based gaming did not seem to make a positive difference in student scores in the final assessment of content objectives overall. This finding conflicts with the assertion by many DGBL advocates, that DGBL would be universally beneficial to all students. In the study by Ernst and Clark (2012), DGBL with computer software did not show any evidence of raising student assessment scores across the board. Of course, DGBL being *beneficial* to student learning does not necessarily mean that using it would raise test scores. DGBL may positively contribute to a number of other factors in the classroom, and whether or not DGBL is a useful tool for implementation has yet to be seen.

Student opinion and personalized learning. Along with the dearth of quantitative data showing actual effect of DGBL on student learning outcomes, another theme that emerged was related to the students' opinion of using video games in the classroom. According to interviews conducted by Ernst and Clark (2012), some students thought that using computer games for learning in the classroom was beneficial while others did not. One student said "In a way it could make learning fun for certain students. Then again it could be tricky for others" (Ernst & Clark, 2012, p. 44). In another study conducted by Overby and Jones (2015), the focus was looking at potential methods for using Minecraft™ to support visual art curriculums. However, the only participants who were observed were children who were already invested in playing the game on their own. Therefore, there was no opportunity to find out if different kinds of students would agree on using Minecraft™ to support the arts curriculum. There is simply not enough empirical evidence to suggest that DGBL would be beneficial or welcomed by all students in general.

The idea that not all students agree on using DGBL in the classroom actually supports the notion that learning needs to be personalized; a point that most of the anecdotal literature also mentions (Squire, 2011; Farber, 2015; Gee, 2007). Initial findings in these four studies would suggest that students may need to have an interest in DGBL in order for it to be effective in helping them to learn, a supposition that requires more research to verify. Educators have long agreed that a large part of effective teaching is getting to know the students: their interests and needs. In order for students to become more engaged in learning; their curiosity and interests should be addressed (Montessori). Along with that, deep learning comes through a personal process of discovery and thinking. How DGBL fits in this puzzle is yet to be determined.

Another relevant finding related to student opinion was the fact that according the qualitative survey collected from Ernst and Clark (2012) the most agreed upon items were "it is

important to know about technology” and “I have a good understanding of how to use technology in the real world (p. 43).” The participants in the study agreed on the importance of technology in general, and its use in the real world. This is pertinent information. If students agree that technology is relevant and useful, then it follows that we should continue to research the best ways that we can use it in the classroom. This is another instance where empirical research and the literature align: Exploring the use of DGBL in the K-12 classroom is a worthwhile endeavor. In his book, Kurt Squire (2011) says “games, when they work, are aesthetically enlivening experiences, worthy of study in and of themselves as a part of the human experience...” As teachers, it is important for us to be aware of those “aesthetically enlivening experiences”, particularly the ones that are most relevant in our own students lives, in order to leverage learning in the best ways possible. Squire goes on to say that “...the moral imperative to study enlivening experiences is especially true for educators who are responsible for shaping the daily lives of children... (p. 15).” Digital games have become a large part of our world, and common sense tells us that it would be a significant opportunity for learning lost as educational research moves forward.

Potential benefits.

Increased collaboration and participation. Across the four studies, there was evidence of some potential benefits from DGBL on student learning. Use of DGBL in several cases showed increased levels of collaboration and active participation between students, according to observations (Overby & Jones, 2015; Ernst & Clark, 2012; Khalili, Sheridan, Williams & Clark, 2011; Annetta, Cheng, & Holmes, 2010). For example, Overby & Jones (2015) observed students of different ages working together within the digital world of Minecraft™ in order to help each other build new worlds. In another study by Khalili, Sheridan, Williams & Clark

(2011), high school students were asked to work in groups of four to create their own video games that included learning concepts on immunology in the science curriculum. They found that students were actively participating with each other and collaborating within their groups to achieve the task. In another study by Annetta, Cheng & Holmes (2010) high school students were given a computer game based scenario in which they needed to use their science content understandings to beat the game. As the study progressed, students actively discussed “game play and science acquisition with their peers both in-game and around the classroom (p. 107).” Similar findings were consistent across all four studies. This aligns with assertions in the literature that advocate for the use of video games in the classroom because they have the potential to increase participatory learning (Squire, 2011) and social collaboration (Gee, 2007; Farber, 2015; Devlin, 2011).

Higher engagement. A final theme that emerged from the research was that the use of DGBL in different ways across several classroom settings seemed to produce higher engagement in students based on observation. This is a finding that both empirical research as well as anecdotal literature agrees on. All four of the empirical studies mentioned higher engagement being a noticeable factor in the classrooms that used some form of DGBL (Overby & Jones, 2015; Ernst & Clark, 2012; Khalili, Sheridan, Williams & Clark, 2011; Annetta, Cheng, & Holmes, 2010). Of course, one of the main reasons that DGBL is an emerging field of research is because video games are highly engaging, and scholars want to know how best to use them in an effective way in the classroom (Gee, 2007; Squire, 2011).

Conclusion

Over the past few decades, digital gaming has exploded onto the cultural scene as a growing phenomenon. Digital gaming is now connected into our daily lives. Because of this,

scholars in the field of education and other disciplines have become increasingly interested in exploring the potential benefits of leveraging digital games for learning in the classroom. Many books have been published on the subject, but a dearth of empirical research remains, leaving us wondering about the actual effect of DGBL in the K-12 classroom. The few studies published in the last five years and reviewed in this paper reveal limited findings that point toward DGBL improving engagement, increasing collaboration and active participation, as well as offering new opportunities for personalized learning.

Implications for student learning. While the field of research around DGBL is still growing, there are certainly some takeaways worth noting. First of all, it is clear that a big part of good teaching practice is getting to know the students in the classroom. As video games are now a part of daily life, especially when it comes to the current generation, it only makes sense that we, as educators, would find out as much as we can about how to leverage DGBL to engender and improve learning. The learners of today are changing, as much of the research around video games and learning would suggest (Cimbricz, Stoll, & Wilkens, 2014). The educational system needs to change along with them. What good is an educational system if it is not relevant to the learners it is trying to serve? DGBL has the potential to be a motivating and engaging tool in the classroom, as well as a lightning rod for student collaboration. This brings us ultimately to the implications for my own personal teaching practice.

Implications for teaching practice. The very fact that DGBL research is undeveloped makes it the perfect arena for my own practice. As a teacher, it is my job to explore the things that are interesting to my students, if only to find one more entry point for meaningful learning. I must keep an open mind to any tool that can support teaching and learning, including DGBL. I will do research around DGBL and the learners in my own classroom, as well as becoming a leader in

advocating for its continued study in the field of education in general. For me as an educator, it is of the utmost importance that I do not latch onto new ideas and practices just because they are being called the next “golden goose”, or answer to all of the educational challenges out there. While DGBL is certainly a worthwhile avenue of study, it is not the only one. As we have seen, there are some potential promises it offers: greater student engagement, student collaboration, and opportunities for personalized learning. However, there are also perils; DGBL may not work for everyone, and much more research is needed to understand its actual effects on learning outcomes.

Implications for future research. One thing is clear when it comes to the study of DGBL: More research is needed. This is reiterated by every book and article on the topic, whether it is anecdotal or empirical. Finding out how to best leverage DGBL in the K-12 classroom is an essential line of research to follow, because it is so incredibly relevant to the current generation of learners. The educational community has a great opportunity to dig into this novel area of research with fervor, knowing that we are doing so in order to engage students in active and relevant learning.

As research in the area of DGBL continues, it may be beneficial to have a discussion around terminology. Due to the novelty of this area of study, we have a rare opportunity to raise this issue. When it comes to DGBL, every bit of writing on the topic uses different terms, including but not limited to: video games for learning, gaming, educational gaming, digital gaming, digital game based learning (DGBL; which I elected to use throughout this paper), gamification and more. Part of the reason for this overwhelming list of terms and definitions may be that there is an ever expanding universe of digital games, programs, and game based tools. Each of them is created for a specific purpose with specific technology, but the context for their

use is constantly changing. With each new wave of technology come new terms and definitions to suit a new context. For example, video games may refer simply to games that are played on a personal console system such as an Xbox™ or they may refer to a wider group of games that include video-like properties and gamer interactions. The terminology seems to be expanding as quickly as the technology. Another reason that there is a long list of terms is that researchers from different fields tend to approach such terminology from contrasting lenses. Due to the expanding list of terms, I would suggest that the field of education adopt DGBL (digital game based learning) as an overall term to address any situation in which digital gaming is leveraged to support learning. As research continues along this vein in the field of education, the use of common terminology may help to streamline the process.

Another factor important to moving this research forward is collaboration across disciplines. Though the pool of empirical studies is still small, most of them have taken the opportunity to work together with researchers from other fields. Collaboration across disciplines is highly beneficial, as DGBL is a complex subject with many moving parts. Educators would benefit from being willing to work with video game designers, business marketers, scientists, artists, psychologists so that we gain a holistic view of the actual effect of DGBL in the K-12 classroom.

Research in the area of DGBL is nascent, particularly as it relates to learning in K-12 classrooms. Based on what we know so far, there are many avenues that could be explored: engagement/motivation factors, the effect on social participation and collaboration, relationships to the interests of students in different grade levels, and actual effects on learning outcomes. The list of research avenues related to DGBL is expanding. The learners in our classrooms are changing, integrating digital games into their lives more and more. It makes sense to follow their

lead. Digital games provide a space where learning through play can exist, largely enabled by technology. And after all, isn't learning through play what we've really been talking about all along? Research has only scratched the surface of what DGBL could contribute to the world of education, and now is the time to continue playing with new ideas. The only thing left to say is this: tag, you're it!

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