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Building 21st century business skills in high school business classrooms using digital games and simulations

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Building 21st century business skills in high school business classrooms using digital games and simulations

Abstract

Digital games and simulations are often seen as fun activities to reward students but their potential is much greater. This literature review examined how integrating digital games and simulations into secondary business curriculum can help students build the skills needed for the 21st century workplace in an environment that is conducive to how they learn best. The effects of digital games and simulations on student motivation are also examined as well as how to assess student learning while using these tools. The information found came from peer-reviewed journals, books, and studies from the Web. Digital games and simulations have proven to have a positive effect when used in secondary classrooms. More research needs to be compiled on how to implement them successfully in the classroom.

BUILDING 21ST CENTURY BUSINESS SKILLS
IN HIGH SCHOOL BUSINESS CLASSROOMS
USING DIGITAL GAMES AND SIMULATIONS

A Graduate Review

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Division of Instructional Technology

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Introduction

Schools should evaluate teaching strategies used in the classroom to better meet the needs of students and prepare them for the 21st century business world. Employers are looking for employees who are technologically literate, can collaborate with others effectively, use critical thinking skills, and can communicate effectively (*Partnership for 21st Century Skills*, 2009). Digital games and simulations can help students learn these skills as well as gain experience in a real-world setting (Collins & Halverson, 2009). Many teachers and adults view digital games and simulations as “a waste of time” (Gee, 2007, p. 21). This review examines the effects of using digital games and simulations in business classrooms to help students become engaged and motivated in learning the skills necessary for the workplace. It studies how digital games and simulations can be used to teach 21st century workplace skills. This review shares ways teachers can assess students when using digital games and simulations in the classroom. Overall, the review will explain how digital games and simulations can be used in the classroom to prepare students for their future.

The business world today is a constantly changing, fast-paced environment. Technology is transforming the skills employees need, such as “reading and interacting with the web; writing memos and sending email; computing with spreadsheets and statistical analysis programs; analyzing problems with data visualization tools, making presentations with PowerPoint” (Collins & Halverson, 2009, p. 9). To better prepare secondary students with these skills needed to be productive employees, teachers should try to use a medium to keep students engaged and motivated in the material as well as imitate real-world experiences. Digital games and simulations are teaching tools that can

be used in business classrooms to provide students with authentic, meaningful experiences (VanEck, 2006). It is important for educators to realize the benefits these tools can bring to the classroom.

Students are ready to be taught using different media and soon “will demand it, to the point that management, teachers, and administrators can no longer resist” (Prensky, 2002, p. 4). Teenagers are captivated by technology and enjoy spending time playing digital games. According to Prensky (2001), the average teenager in America “watches over 3 hours of television, is on the Internet 10 minutes to an hour, and plays 1 ½ hours of video games” (p. 37). The American Federation of Teachers has claimed from as far back as 1988 “only 20 to 25 percent of students currently in school can learn effectively from traditional methods of teaching” (as cited by Prensky, 2001, p. 17). Schools have done very little to adjust to the way students’ learn in terms of keeping up with the media that students want to use. If there are ways to incorporate what students enjoy doing with business curriculum, digital games and simulations could be used to help students become engaged in the material, motivated to learn, better prepared with the skills needed for the future, and learn with a medium they enjoy.

Business teachers need to find ways to integrate real-world business scenarios into their secondary classrooms. Digital games and simulations can be implemented to help students learn different business skills needed to solve real-life issues that occur in the workplace. Teachers can use these tools to meet the learning needs of students as well as help them obtain the skills to be competitive in a global job market. Using digital games and simulations in the classroom may lead to a new way of assessing students not on the knowledge they know but the skills they have obtained to be

successful employees in the workplace. This review will examine the impact of digital games and simulations when used in the high school business classroom, how student motivation can be increased with the use of digital games and simulations, the 21st century business skills students can learn using these tools, and ways to assess the business skills learned.

Secondary teachers may need to consider the value of digital games and simulations and how they can be used in the classroom. By integrating digital games and simulations into the classroom, students may receive authentic experiences to learn the skills needed in the 21st century workplace. The results of this review will explore how digital games and simulations may be used in the classroom to help teachers see the effects these tools have on student learning.

Digital games and simulations may be a great asset to any classroom. In order to change the stereotype that digital games and simulations can only be used for fun, there are questions to be examined. These questions include:

1. What impact can digital games and simulations have on student learning in the business classroom?
2. What effects could digital games and simulations have on motivation in the business classroom if integrated into the curriculum?
3. What business skills can students learn using digital games and simulations to better prepare them for the 21st century workplace?
4. How can students' knowledge of business skills be assessed when using digital games and simulations?

Methodology

Identifying and Locating Sources

Using digital games and simulations in the classroom has become a topic of discussion in education. In order to find research articles on the topic of this review, several different resources were used. The digital search engine, *Google Scholar*, was used to find an array of articles dealing with digital games and simulations in education. *The University of Northern Iowa's Rod Library Panther Prowler* produced results from a variety of different databases, with a majority being found from the *ERIC U.S. Department of Education* and *ERIC EBSCO*. Relevant resources were also sought through a snowballing process where reference lists in useful articles were scoured to identify and review additional articles.

Descriptors used. The descriptors and key words used included *digital games, online games, video games, simulations, business education, high school, financial literacy, digital games used in education, digital learning, 21st century skills, and assessment of digital games*. These words were searched either by themselves or together, such as “digital games and simulations,” “digital games and simulations and business education,” or “digital games and simulations and financial literacy.” All of these descriptors were used with each search engine.

Selecting Sources to Analyze

After a wide variety of resources were found using the above mentioned key words and descriptors, the selection of articles was narrowed down. First, the title and abstract were evaluated to see if the information in the article pertained to the purpose of the paper. Second, the article had to deal with digital games and simulations and/or

education, preferably in the high school classroom. Then, the date was reviewed to see if it was written within the last ten years to ensure the information was current. Fourth, articles were selected because they were empirical studies or literature reviews of studies on digital games and simulations used in the classroom. By analyzing the sources, the number of articles was narrowed down to studies that addressed the research questions.

Procedure for Analyzing Sources

Once a resource was selected to be analyzed, the author's credentials were checked to see what else he or she had done in the field of study. The author's information was often available within the resource. In addition, the article's citations in other research papers were searched using *Google Scholar* and evaluated to see how the information was used in other studies. Once an article was deemed reliable, a quick scan of the research was completed. Major headings were read as well as the introduction, results, and conclusion sections of the paper. If information found in an article could answer one of the research questions, it was then read in more detail.

Criteria for Evaluating Information

The information found was evaluated based on the relevancy to the topic and how well the information helped answer the research questions. In order for the resource to be relevant to the topic, it had to discuss how digital games and simulations were used in classrooms and the effects these tools had on student learning and motivation, learning 21st century skills, and assessing what students learn. After each article was read, the information was evaluated to ensure it supported one or more of the research questions. Articles that met these criteria were chosen to be used in this literature review.

Analysis and Discussion

Technology is transforming how people operate in the business world (Collins & Halverson, 2009). Society is becoming reliant on technology so it is starting to become a requirement that adults interact with it in all settings (Vogel, Vogel, Cannon-Bowers, Bowers, Muse, & Wright, 2006). Four specific areas will be reviewed on the use of digital games and simulations in the classroom. These areas are the impact of digital games and simulations on student learning, effect of these tools on student motivation, 21st century skills learned with the use of digital games and simulations, and ways teachers can assess student knowledge when using these tools in the classroom.

Impact of Digital Games and Simulation on Student Learning

Four areas will be reviewed as to how digital games and simulations affect student learning. These explanations include how these tools impact learning environments for students and teachers, meet students' demands of wanting their learning to be engaging and meaningful, allow teachers to teach with the medium students relate to, and give students real-life experiences. When digital games and simulations are successfully integrated into business curriculum, they may prove to be effective for learning essential business skills but also change the way schools educate their students and how businesses train their employees.

Changing Learning Environments. Digital games and simulations change the learning process for students. Katherine Griffin, whose business created a financial simulation entitled *Money U*, explained, "A game-based environment allows us to stimulate skills. Students can experiment for different outcomes, and they can, through trial and error, begin to develop those skills" (as cited in Ash, 2009, Introduction section,

para. 6). Learning skills become relevant and meaningful for the students because learning takes place in the environment in which skills are demonstrated in real life and teaches the students to make responsible decisions in all circumstances (Ash, 2009).

VanEck (2006) found in his review of digital game-based learning articles that digital games and simulations are effective because the participants must demonstrate skills in the environment where they occur, decide if their decisions are correct based on the immediate feedback received, and allow the participants to be successful once the correct choices have been made.

Digital games and simulations give students an opportunity to explore entire worlds they may never have the opportunity to experience in real life (Squire, 2005). Through the use of digital games and simulations that allow students to connect with others outside of the classroom, students learn how to interact with various people and seek out the most knowledgeable to help them solve their situation (Prensky, 2001). R.F. Bowman explained, “Teachers can use video games to improve learning environments, provide clear goals, challenge students, allow for collaboration, use criterion based assessments, give students more control over the learning process, and incorporate novelty into the environment” (as cited in Squire, 2003, p. 4).

Digital games and simulations provide students with an opportunity to learn in a realistic environment where they can obtain understanding on specific information and solve authentic problems while being active in their learning (Ke, 2009). Sitzman (2011) completed a meta-analysis study of the effects simulation games have on work-related knowledge and skills, which included 65 independent samples from 55 studies and data from over 6,000 adult corporate trainees. His results found that “simulation games are

more effective than other instructional methods because they simultaneously engage trainees' affective and cognitive processes" (Sitzman, 2011, p. 489). There may be great potential in using digital games and simulations to help meet the demands of their students.

Meeting the Demands of Students. The learners of the current generation are ready to use different media than those currently being used in the classroom. Students feel when they come to school, they have to *power down* because they do not "relate well to the traditional teaching methods" (Prensky, 2001, p. 17). Gamers are used to high-intensity engagement and active participation and feel traditional classrooms are low in motivation, challenge, and feedback (McGonigal, 2011). Gee (2007) stated "the theory of learning in good video games fits better with the modern, high-tech, global world today's children and teenagers live in than to the theories (and practices) of learning that they sometimes see in school" (p. 5). Vogel, Vogel, Cannon-Bowers, Bowers, Muse, and Wright (2006) completed a meta-analysis study of 32 reports on whether games and interactive simulations or traditional teaching methods produced the highest cognitive gains for learners from preschool to high school. Their results showed attitudes toward learning and cognitive gains were significantly higher in students that used digital games and simulations compared to those that used traditional instructional methods (Vogel et al., 2006).

Digital games to the current generation of students are rich, fun, and engaging unlike the current learning that they view as painful and boring (Prensky, 2002). Students find games challenging and exciting, and learning in digital environments makes current teaching practices seem tedious and meaningless (Papastergiou, 2009). Shaffer, Squire,

Halverson, and Gee (2004) explained using games in the classroom “bring together ways of knowing, ways of doing, ways of being, and ways of caring” (p. 7). Games allow students to create virtual worlds that help them develop “situated understandings, effective social practices, powerful identities, shared values, and ways of thinking of important communities of practice” (Shaffer et al., 2004, p. 11) to make the material more meaningful for the students. In a study with twenty-one undergraduate students majoring in education, it was found that game play encouraged students to perform in the classroom by engaging them in the material, allowing them to practice problem-solving skills in an interesting environment, and providing an opportunity to understand difficult material in a real-world setting (Sardone & Devlin-Scherer, 2010). The use of digital games and simulations may help students become better learners because they are learning with a tool that is relevant and meaningful to them.

Teaching in a Meaningful Medium. The use of digital games and simulations are increasingly becoming the main form of entertainment for consumers. In America, five out of every ten consumers and employees play some form of video games (Beck & Wade, 2006). The scientific journal *Cyberpsychology, Behavior, and Social Networking* found of the Chief Executives Officers, Chief Financial Officers, and other senior executives they surveyed, 61% take daily game breaks at work (as cited by McGonigal, 2011, p. 11). According to Beck and Wade (2006), the total size of the gaming generation is already far greater than the baby boom ever was” (p. 17). The gaming generation is spending more money on video games than going to the movies and is spending more time playing video games at home than watching videos. Through games, students are

learning important lessons about their role in society; how the world works, how to relate to people, and how to react in society (Beck & Wade, 2006).

Schools in America are “working hard to educate a new generation in old ways” (Prensky, 2001, p. 17). It is not that schools do not want to keep up with how students learn; it is more that a new way of teaching will need to be invented and taught to the teachers (Prensky, 2001). With the large population of gamers and the time spent playing games, schools may need to evaluate how students are taught to better prepare them for an ever changing business environment.

Changing Business Environment. New business environments are emerging due to the gaming generation. Gamers want to “work on virtual teams distributed around the world, undertaking multiple endeavors, taking advantage of the thought process that succeeded for them in digital gaming (Banerjee, 2008, A Changing Business Landscape section, para. 3). Beck and Wade (2006) conducted a nationwide research survey of more than 2,500 American business professionals to determine if there is a difference in attitude about work between gamers and nongamers. They discovered gamers are passionate about adding value to their work and are not motivated by greed alone. Successes in digital games have led these future employees to consider themselves experts with “50 percent of gamers think of themselves as experts, with game experience driving that average up significantly” (p. 79). Digital games and simulations have helped the current generation believe in themselves and their abilities, allowing more work to be done at the workplace (Beck & Wade, 2006).

Gamers understand results matter and are “confident that, under pressure of real-world performance, they will bring the commitment, the drive, and the professional skill

it takes to deliver results” (Beck & Wade, 2006, p. 96). Business is starting to realize these changes and is embracing the characteristics of the gamer generation by incorporating learning with digital games in their corporations (Prensky, 2001). The *McKinsey Quarterly* has reported “more than 60 percent of all United States corporations have used some kind of learning simulation (Prensky, 2001, p. 228). Companies have used digital games and simulations for educating customers, educating suppliers, creating business strategies, conducting compliance and policy training, certification and continuing education, customer service training, disaster preparation, diversity awareness, manager training, product knowledge, professional skills, project management, team building, and many other forms of training (Prensky, 2001). If businesses are able to find ways to incorporate digital games and simulations into their everyday business activities to meet the characteristics of their employees, schools should consider following their example to start meeting the learning needs of their students.

Business digital games and simulations will help schools keep up with the business world (Ash, 2009). *MoneyU* is a web-based program that covers personal finance topics and allows students to learn financial skills through trial and error (Ash, 2009). It was found that students who participated in *MoneyU* “performed much higher on financial literacy tests than those who had not” (Ash, 2009, Introduction section, para. 5). The digital *Stock Market Game* has given students a chance to become investors in the stock market, which was found to help improve financial literacy and math skills (Ash, 2009). Students are able to learn the skills necessary to run a business with others using the *Virtual Enterprises Simulation* (Hughes & Golann, 2007). Through a survey given to students regarding their feelings about using the *Virtual Enterprises Simulation*, it was

found that 75% of the respondents felt the program helped them develop problem-solving skills, 74% indicated it helped them learn to work with different types of people, and 79% said it helped them develop realistic expectations of the workplace” (Hughes & Golann, 2007). According to Shaffer et al., (2004), digital games and simulations will help:

build an educational system which students learn to work (and thus to think) as doctors, lawyers, architects, engineers, journalists, and other important members of the community—not in order to train for these pursuits in the traditional sense of vocational education, but rather because developing those epistemic frames provides students with an opportunity to see the world in a variety of ways that are fundamentally grounded in meaningful activity and well aligned with the core skills, habits, and understandings of a postindustrial society (p. 12).

These research studies indicate that digital games and simulations can help students develop the skills needed to be successful in the 21st century workplace.

Effect of Digital Games and Simulations on Student Motivation

Motivated learners are engaged in their learning, enthusiastic about what they are doing, persistent to work hard, and self-determined (Garris, Ahlers, & Driskell, 2002).

Digital games and simulations enhance student motivation because they allow students to be challenged, curious, engaged, and determined to achieve the goal of the game. In his review of educational literature on the motivating nature of games, Kafai (2001) explained digital games and simulations “produce beneficial effects such as increased motivation and also a better understanding of the content matter under investigation” (Games-To-Teach section, para. 2). Digital games and simulations can improve students’

motivation in not only business classrooms but also all subject areas by increasing engagement, presenting a challenge, allowing control, providing rewards, and organizing information in a comprehensive manner.

Increases Engagement. Digital games and simulation can help students become engaged in the material they are learning in the classroom. Mysirlaki, Papagianni, and Paraskeva (2009) completed a review of literature on the potential of online games as educational tools. They found digital games and simulations were good educational tools to increase students' engagement because they were fun, challenging, and provided instant feedback but also created an experience where the students were immersed in the information causing interest in what they were learning (Mysirlaki, Papagianni, & Paraskeva, 2009). Hoffman and Nadelson (2009) assessed 189 video game players from undergraduate and master degree-level education courses at a large southeastern university to determine engagement in gaming. The gamers reported that by being engaged in the information of the game, they "use self-regulation strategies to plan, monitor, and evaluate learning in an effort to reach their academic goals" (Hoffman & Nadelson, 2009, p. 247).

Papastergiou's (2009) study of 88 high school students found those who used an educational game instead of an educational website to learn new material "exhibited high levels of engagement in their effort to maintain their number of lives, reach the termination flags, and achieve a high score" (p. 8). Those students playing the game were relatively quiet due to immersion in the game compared to those students using the website who often had discussions irrelevant to the material being taught (Papastergiou,

2009). Digital games and simulations help students relate better to the material because they are immersed in what they are doing and become motivated to do better.

Students become engaged in games by identifying with the character of the game to the point they become the character (Mysirlaki et al., 2009). They either are so intrigued by the character that they want to inhabit him/her and project their own fantasies, desires, and pleasures onto the character or they get to develop a character from scratch to portray themselves or someone they would like to be (Gee, 2008). They want their character to succeed so they will continue to return to the game with greater persistence and intensity of effort (Garris et al., 2002). Digital games and simulations help motivate students by engaging them in the material as they attempt to achieve the goal of the game.

Presents a Challenge. The gamer generation likes a good challenge. Hoffman and Nadelson (2009) found 89% of the 189 college gamers surveyed were “very determined to reach games goals,” and 91% said “sticking with a challenging task was rewarding” (pp. 261-262). They also found 71% of the respondents liked having the “responsibility of handling a situation that requires a lot of thinking” and 69% would “rather do something that is sure to challenge their thinking abilities” (Hoffman & Nadelson, 2009, pp. 260-261). In an examination on gaming/simulation literature to find the unique aspects of games that enhance learning, Garris et al. (2002) found students enjoy games that “employ progressive difficulty level, multiple goals, and a certain amount of informational ambiguity to ensure an uncertain outcome” (p. 6). Hainey, Connolly, Stansfield, and Boyle (2011) conducted an analysis of three surveys completed by higher education students to determine the reasons for playing computer games. They

found that “challenge was the most important reason for playing computer games” (Hailey et al., 2011, p. 2203). Students are looking for a challenge in the classroom and digital games and simulations may provide them with what they are looking for.

Digital games and simulations present challenges to students in several ways. They can provide students with complex situations where they must assume roles, analyze problems, and create solutions (Sardone & Devline-Scherer, 2010). Digital games and simulations often increase in difficulty, where students must take what they learned in the previous level to accomplish the next set of tasks so they are continually being challenged in order to complete each level to accomplish the overall goal (Mysirlaki et al., 2009). Good games make challenges hard but doable and will give immediate feedback to let students know the progress they are making and if they are moving in the right direction of success (Gee, 2008). By being challenged to reach certain goals, students are motivated to continue to learn and master the skills needed to advance to the next level.

Allows Control. Teachers who provide students with the opportunity to take control of their learning often see increased motivation and greater learning in the classroom (Garris et al, 2002). Good learning occurs when the student becomes the producer of the material and not the consumer (Gee, 2008). Good games encourage players to co-create the experiences they are having as well as the world they are in based on their decisions and actions (Gee, 2008). Digital games and simulations are a great tool to use to give students personal control of their learning because “users are allowed to select strategies, manage the direction of activity, and make decisions that directly affect outcomes, even if actions are not instructionally relevant” (Garris et al., 2002, p. 7).

Hoffman and Nadelson (2009) found during the interviews of their study's participants that the ability to control the game's characters and environment were important motivations to play a game.

Digital games and simulations put the learner in the role of decision-maker, giving them the opportunity to decide what to do next and learning through trial and error (Mysirlaki et al., 2009). Students become motivated to be the first to gain facts, interact with the story line based on their decisions, and customize their own character (Hoffman & Nadelson, 2009). Games allow students to “explore, manipulate, and hopefully master their gaming environment” (Hoffman & Nadelson, 2009, p. 247). Digital games and simulations often can provide students with the opportunity to learn in an environment they helped to create based on their decisions.

Provides Rewards. Students are often looking for instant gratification and rewards as well as a sense of accomplishment in the classroom. Digital games have taught students that even with a limited set of tools, some combination of the tools will work and there will be a reward (Beck & Wade, 2006). Since students are able to learn more in a faster amount of time when teachers use digital games and simulations, they are more motivated and engaged in their learning (Vogel et al., 2006). Hoffman and Nadelson (2009) found the college gamers in their study felt “gaming was a diversion to relieve stress and in many cases fostered feelings of well-being and accomplishment” (p. 257). Since many games are based on accomplishing and learning a level in order to get the next, students often enhance their self-esteem with each level they complete (Hoffman & Nadelson, 2009). Students playing games often “achieve a state of optimal

experience known as flow” (Hoffman & Nadelson, 2009, pp. 248-249). Hoffman and Nadelson (2009) described how flow works:

Individuals reporting flow indicate that task-related challenges and requisite skills are compatible; capabilities are stretched, and probabilistic goal-directed outcomes increase the likelihood of learning new skills and elevating self-esteem due to anticipated success. Success with goal-directed behavior delivers immediate feedback, increasing emotional involvement, and induces positive feelings. The positive effect, in turn, leads to increased enthusiasm, drive, alertness, interest, and joy (pp. 248-249).

If students experience flow, they come to care more about the process than the results (Zhi Feng Lui, 2011). If teachers can find digital games and simulations that allow students to experience flow, they will the students the chance to be rewarded repeatedly.

Organizes Information in a Comprehensive Manner. Learning becomes more meaningful to students if they connect the material they are learning to something they already know. Kaufman, Sauve, and Renaud (2011) found in a study to determine whether playing online games resulted in improved cognitive skills of secondary school students that “games help the learner organize previously acquired information in a more comprehensive manner” (p. 411). Students are able to keep building on the material they are learning in games, making it easier to organize information because they learn to integrate the old and the new material (Kaufman, Sauve, & Renaud, 2011). Games allow students to “retain, connect, and transfer learning from their gaming experiences to future learning and experiences” (Kaufman, Sauve, & Renaud, 2011, p. 412) since the digital games and simulations are teaching them real-world information. Good games order

problems from simple to complex in order for students to solve the easier ones with ideas that will help them with the harder problems (Gee, 2008). In a study conducted by Hernandez, Gorjub, and Cascon (2010) of postgraduate business students, digital games and simulations used in their business classrooms provided the students with immediate feedback, active participation, experience with on-the-job situations, preparation for the uncertainty of business, and the motivation to succeed in a competitive environment. Digital games and simulations help students stay motivated because they keep building on material they already know and give them the experiences they can relate to real-world situations.

21st Century Business Skills Learned with Digital Games and Simulations

The 21st Century skills of “critical thinking and problem solving, teamwork and communication, creativity and innovation, and technology proficiency” (Sardone & Devlin-Scherer, 2010, p. 421) are what employers want in their future employees. Digital games and simulations help students learn these skills by “enabling innovative learning methods that integrate the use of supportive technologies, inquiry learning, problem-based approaches, and higher order thinking skills; and engaging students with real world data that actively engages them in solving meaningful problems” (Kaufman, Sauve, & Renaud, 2011, p. 411). Information on how digital games and simulations can be used as tools to help teach these 21st century skills of critical thinking and problem solving, teamwork and communication, creativity and innovation, and technology proficiency will be examined.

Critical Thinking and Problem Solving. In a study with twenty-one undergraduate students majoring in education, it was found that digital games and

simulations can get students to start thinking critically and caring about real-world issues they will one day deal with at the workplace (Sardone & Devlin-Scherer, 2010). For example, when a game titled *Hot Shots for Business* was used in the classroom, students developed critical thinking skills by learning how to monitor multiple events, respond to unexpected situations, and focus attention to details as they attempt to run a successful business (Sardone & Devlin-Scherer, 2010). Another study of 140 senior business university students showed that the students developed critical thinking skills in the experiential learning experiences of digital games and simulations when they were asked to design, apply, and control different business strategies (Xu & Yang, 2010). Games help students “think in strategic ways, solve complex problems, and integrate knowledge across business functions” (Xu & Yang, 2010, p. 223).

Students develop critical thinking skills with digital games and simulations because they learn to “*read* visual images as representations of three-dimensional space, develop multidimensional visual-spatial skills, and hone their mathematical problem-solving and reading-comprehension abilities” (Sardone & Devlin-Schere, 2010, p. 410). Digital games and simulations help students “form mental maps, develop inductive reasoning, be more engaged in learning, and respond faster to expected and unexpected stimuli” (Sardone & Devlin-Scherer, 2010, p. 410). Games are designed around solving problems to advance to the next level (Gros, 2007). By exposing students to digital games and simulations, these future 21st century employees are developing important skills, critical thinking and problem solving, that employers are looking for in their employees (Sardone & Devlin-Scherer, 2010). Schools may find by using digital games

and simulations, students are learning the skills of how to think critically and solve problems in real-world situations to be better prepared for the 21st century workplace.

Teamwork and Communication. Two important skills needed in the 21st century workplace are the ability to work effectively with a team and to communicate successfully with all types of people (Beck & Wade, 2006). In their study of business professionals, Beck and Wade (2006) found the “game generation has highly developed teamwork skills and a strong desire to be a part of a team” (p. 82). Digital games and simulations help students develop these skills because they bring people together in their *gaming communities* (Shaffer et al., 2004). Shaffer et al. (2004) explained when students are involved in a gaming community, they seek out “news sites, read and write FAQs, participate in discussion forums, and most importantly, become critical consumers of information” (p. 5). By playing digital games and simulations, students interact with others beyond the brick-and-mortar classrooms to cooperatively figure out how to conquer the game (Shaffer et al., 2004). They learn to communicate their ideas and information to others in the gaming community (Shaffer et al., 2004). As Shaffer et al., (2004) discovered, “the virtual worlds of games are powerful, in other words, because playing games means developing a set of effective social practices” (p. 5). Beck and Wade (2006) found in their study that employees who grew up in the gamer world are already “more social, more loyal to their teams, more sophisticated decision makers than their counterparts that didn’t play video games in their formative years” (p. xii). Digital games and simulations used in the classroom give students the experience of working and communicating with a diversity of people.

When playing digital games and simulations, students must communicate and collaborate with others to learn how to achieve the goal of the game. In their study of college business students, the students improved their communication and collaboration skills when they gave feedback to help others understand what they did in the game, to inform each other what his/her responsibilities would be to help achieve the goal of the game, and to decide what to do next (Xu & Yang, 2010). Students' learning is enhanced and knowledge is developed through this interactive and extensive communication (Xu & Yang, 2010). Digital games and simulations give students the opportunity to communicate in a medium they are comfortable with as well as using technology that is used in the workplace.

Creativity and Innovation. Employers are looking for employees who are creative and innovative. Gee (2008) explained "Young people in the United States are being prepared for standard jobs in a world that will very soon reward people who can do *innovation work*" (p. 165). Modern games give students the opportunity to modify and create their own scenarios and then share what they have created with others digitally (Gee, 2008). Games allow students to be creative because they develop their own ideas and are given opportunities to share what they have discovered with others.

Social innovation is a term used to describe when ordinary people apply "entrepreneurial ways of thinking and working to solve social problems that are ordinarily tackled by governments or by relief and aid agencies" (McGonigal, 2011, p. 334). For example, *EVOKE*, a social networking game, was designed to give players the opportunities to tackle social problems in Africa such as poverty, hunger, access to clean water, and human rights. By giving the opportunity to tackle real-world problems,

students will see how their ideas can be used to solve real-world problems and will feel more comfortable brainstorming new ideas to solve any problem. Digital games and simulations may help give students confidence in their ideas because they can see what affect they have on others. (McGonigal, 2011)

Technology Proficiency. Digital games and simulations give students the chance to use software that they will use in the business world. Through simulations such as *Virtual Enterprises*, students are able to master office skills, become proficient in business software such as the Microsoft Office package, critical thinking skills, problem-solving skills, and interpersonal skills (Hughes et al., 2007). Games, such as *Monster Command* and *Key Commando*, help students learn shortcut key combinations to increase their speed when using the computer (Prensky, 2001). By using the computer to play digital games and simulations, students may become proficient in technology skills needed in the workplace.

Businesses want their employees to not only be proficient in how to use technology but also know how technology works. Students who have been given the opportunity to reflect on their game play are “aware of the design grammar by which effects are achieved and relationships established through digital game technologies” (Gee, 2008, p. 168). Walsh (2010) studied two digital game projects in high school English classrooms to see how students’ research, game play, and design of digital games enhanced their literacy. He found the students often teach themselves new technological and programming skills because games are often the cutting edge of interface design and three-dimensional programming techniques (Walsh, 2010). Students become *systems-*

based literate by playing digital games and simulations (Walsh, 2010). Walsh (2010) described *systems-based literacy* as:

an understanding of how to configure the machine or device the digital game is played on, in addition to knowing how to play the game and having the knowledge of where to find information that allows a better understanding of the system (game, program, virtual world, etc.) itself” (p. 27).

When students become *systems-based literate*, they gain an understanding that games are more than just for entertainment; they can use them to configure their own characters and situations (Walsh, 2010). By learning how to transform their experiences in games, students design situations that are relevant to them and relate the material they are learning to the real world (Walsh, 2010). When students play games, they develop “the training wheels for computer literacy, and can help to prepare them for science and technology, where more and more activity depends on manipulating images on a screen” (Gros, 2007, p. 29). By using digital games and simulations in the classroom, students are given opportunities to become proficient in how technology works, design their virtual worlds to connect information to their lives, and obtain skills many employers will be looking for in their employees.

Assessment of Student Knowledge when Using Digital Games and Simulations

A big concern many teachers have when using digital games and simulations in the classroom is how to assess students of the knowledge they gained from playing the games (McGonigal, 2011). Since the effects of digital games and simulations in the classroom are still being analyzed, more research needs to be completed on assessing students. However, there are new forms of assessment being used to match the

performances of students when digital games and simulations are used (Squire, 2003). This review describes these new forms of assessments as well as how the use of digital games and assessments may require a new form of learning to evaluate.

Advances in Assessment. Squire (2003) found “new advances in assessment, such as peer-based assessment or performance-based assessment, provided learners with multiple sources of feedback based on their performance in authentic contexts” (p. 6). Teachers at Quest to Learn, a game-based public charter school in New York City, have developed many new forms of assessments. Students interact with *teachable agents*, a software program that knows less than the student so the student must teach his/her virtual character how to solve a problem. Teachers are able to assess what students know based on what they have passed on to their teachable agent. Students are given secret missions, which are assignments students earn the right to complete by discovering its secret location and then figure out the mission before anyone else in the class. Teachers assess students on their problem solving skills as well as the information they use to complete the mission. Students are also assessed with a technique called leveling up. Instead of working on a good grade, students work to earn points in order to move up to different levels. As McGonigal (2011) found, every student has the chance to *level up* as long as they continue to work hard. Students were found to focus more on learning and less on performing, which created positive stress instead of negative. The use of digital games and simulations may encourage teachers to think outside the box on how they assess students but also may change their view of how students learn. (McGonigal, 2011).

Changes in Learning and Assessment. Digital games and simulations give students the opportunity to learn more about the world instead of just facts about the

world. These tools encourage deep learning or “learning that can lead to real understanding, the ability to apply one’s knowledge, and even transform knowledge for innovation” (Gee, 2008, p. 172). Deep learning requires teachers to help students learn how to be instead of how to learn about something. Gee (2008) explained deep learning requires learning to be “not just about *belief* (what the facts are, where they come from, and who believes them) but also strongly about *design* (how, where, and why knowledge, including facts, are useful and adequate for specific purposes and goals)” (p. 172). When assessing students, teachers need to focus on the skills across all the content areas and not just specific to their own area. Instead of assessing knowledge gained, teachers could examine the goals the students reached in the game along with the process they created to reach the goal. The use of digital games and simulations may allow teachers to assess students on the skills they need to be successful in the real world. (Gee, 2008).

Conclusions and Recommendations

Digital games and simulations are effective tools to use in secondary business classrooms to enable students to learn from real-life experiences. Technology needs to be incorporated into secondary business classrooms to better prepare students for their future. Digital games and simulations are useful tools teachers can integrate into their curriculum to help students learn real-life business experience with the use of technology. They increase students' motivation by increasing engagement, presenting a challenge, allowing control, and providing rewards. These tools can help students graduate with the 21st century workplace skills such as critical thinking and problem solving, teamwork and communication, creativity and innovation, and technology proficiency to be successful in their future. Digital games and simulations are even changing the way teachers assess students and how learning is viewed. The use of digital games and simulations in the classroom will greatly affect the education system in the United States as well as the business world.

Impact of Digital Games and Simulation on Student Learning

Digital games and simulations will help schools meet the technology demands of their students by engaging them in the material they are learning to better meet individual learning styles (Gee, 2007; Prensky, 2002). Students relate to technology and will keep demanding it be used in the classroom to assist them in their learning. By integrating digital games and simulations, students get to stay *powered on* at school and will be more involved in the material being taught. They may even start to enjoy school more because they have more control of their own learning. Digital games and simulations help create meaningful learning environments for students to develop problem solving skills in a

real-life situation (Ash, 2009; VanEck, 2006), explore new worlds they may never have a chance to experience (Squire, 2005), and interact with knowledgeable people outside of the classroom (Prensky, 2001).

Many opportunities are available to teachers when using digital games and simulations to meet the needs of their students' learning styles (Squire, 2003). By incorporating digital games and simulations in business classrooms, students are learning how to collaborate digitally and multi-task, which are essential for the changing workplace (Banerjee, 2008). Business digital games and simulations, such as *MoneyU* (Ash, 2009), *Stock Market Game* (Ash, 2009), and *Virtual Enterprises Simulation* (Hughes & Golann, 2007) have already shown to be beneficial tools for teaching students business skills in real-life situations. Not only are digital games and simulations meeting the learning needs of the students, they also help motivate the students to learn.

Effect of Digital Games and Simulations on Student Motivation

As digital games and simulations become integrated into business curriculum, learning environments will be engaging and enriching for the students. Students' motivation will increase because they will have an opportunity to be engaged, challenged, rewarded, have the ability to take control, and be able to organize information in a comprehensive manner. Students become more engaged in their learning with the use of these tools because they get immediate feedback from the game so they can start planning what to do next (Mysirlaki et al., 2009). They become connected with their character and gain a great persistence to get their customer to succeed (Mysirlaki, Papagianni, & Paraskeva et al., 2009; Gee, 2008; Garris et al., 2002). Digital games and simulations present students with a challenge of solving complex situations (Sardone & Devline-

Scherer, 2010) and advancing up the ladder of success (Mysirlaki et al., 2009; Gee, 2008). Students are given the opportunity to take control of their learning in games by customizing their character (Hoffman & Nadelson, 2009), co-creating the experiences they have (Gee, 2008), and strategizing how to best succeed (Garris et al., 2002). Digital games and simulations reward students by increasing how fast they learn (Vogel et al., 2006), relieving stress (Hoffman & Nadelson, 2009), enhancing their self-esteem (Hoffman & Nadelson, 2009), and giving them the experience of flow (Hoffman & Nadelson, 2009).

Digital games and simulations help students organize information in a more comprehensive manner because they must build on the material they have learned to advance to the next level (Kaufman, Sauve, & Renaud, 2011; Mysirlaki et al., 2009; Gee, 2008). By using digital games and simulations in the classroom, teachers will help motivate their students in many different ways as well as prepare them for the 21st century work place.

21st Century Business Skills Learned with Digital Games and Simulations

The 21st century skills employers want employees who are critical thinkers, problem solvers, good teammates, effective communicators, creative, innovative, and proficient with technology. Digital games and simulations can help students obtain these skills in real-world scenarios that train them better for their future careers. Critical thinking skills are developed with the use of digital games and simulations because the students must strategize how to respond to unexpected situations (Xu & Yang, 2010; Sardone & Devlin-Scherer, 2010) and learn how to piece together information that is from a multidimensional environment (Sardone & Devlin-Scherer, 2010). Students

improve their problem solving skills because they must solve problems to get to the next level (Gros, 2007).

Many digital games and simulations include some form of interaction with others to solve the problems so students are gaining experience working as a team to solve a problem (Beck & Wade, 2006; Shaffer et al., 2004). Even though students are not communicating face-to-face during many digital games and simulations, they have to learn to give feedback to their teammates and others that is easy to understand and explicit (Xu & Yang, 2010).

Employers are looking for employees who are able to bring innovations to the table; digital games and simulations not only encourage students to create their own scenarios but they often share what they have created with others (Gee, 2008). There are digital games and simulations that encourage students to solve real-world problems with the hope that they will continue with their ideas as they get older (McGonigal, 2011).

Through digital skills and simulations, students are learning how to use technology and how to create technology (Walsh, 2010). Games are often on the cutting edge of technological design and by using them, students understand what it takes to create games and manipulate the game itself (Walsh, 2010). By using digital games and simulations in the classroom, students will be given opportunities to step outside of the brick-and-mortar classroom to experience skills they will need to know to be successful employees. They will learn crucial 21st century skills needed to be competitive in a global job market.

Assessment of Student Knowledge when Using Digital Games and Simulations

Digital games and simulations are changing the way teachers assess students and

view learning. More research needs to be completed on the best way to assess the skills students are learning by playing games. However, some teachers have already found effective ways to assess students understanding of information. Teachers are using peer-based and performance-based assessments (Squire, 2003). Students are also being assessed by teaching what they know to a virtual character who knows less than them, solving secret missions before the rest of their classmates, and completing different levels based on working hard and learning the skills at each level (McGonigal, 2011). Digital games and simulations are not only changing how teachers assess but also their view on learning (Gee, 2008). Instead of learning about the what, where, and who, teachers are teaching students more the how and why knowledge is useful and relevant to their lives (Gee, 2008). By using digital games and simulations, business teachers will not only be helping their students develop the skills needed for the 21st century workplace, but will also start revolutionizing the current education system in the United States.

The Future of Digital Games and Simulations

Teachers need to be given a chance to see the positive effects digital games and simulations can have on student learning in a business classroom. This review is a start to explain the benefits these tools have on students learning real-world skills for the 21st century workplace. Hopefully the information found will change teachers' opinions in seeing that the purpose of digital games and simulations is to enhance students' learning in an engaging and rewarding way as well as motivate them to learn skills needed to be successful in the 21st century workplace.

As educators start to implement games and simulations more in their classrooms, schools will need to consider providing a laptop for each student and loosen up their

network policies to allow teachers and students access to appropriate digital games and simulations when needed. Students will be held responsible to properly care for and appropriately use the technology they are given, which are two very important skills needed for the future. Curriculum will need to be redesigned to teach students how to respect themselves and others on the Internet as well as how their actions on the Internet may affect their future. Teachers will need to give students more control in the classroom and trust the students to do what they should be doing when using computers. However, students need to learn what is appropriate and what is not appropriate when working on the computer during *work hours*. Implementing digital games and simulations into classrooms may be a crucial step for schools to better prepare students for the 21st century workplace.

Schools will need to reevaluate what is the best way to teach students. The use of standardized tests needs to be reexamined to see if this is the best way to test the students' knowledge. Education departments at the state and national level need to consider if testing for knowledge is best or if tests need to be given that test skills. The questions of whether skills or knowledge is more important for students to learn will need to be answered in order for digital games and simulations to become a trend in the classroom.

Teachers will need to be given time to learn how to implement digital games and simulations in the classroom. Professional development days should be scheduled to allow teachers time to search for games that are applicable to their curriculum. Curriculum may need to be revamped to decide the skills that will be assessed in their subject area. Even though it may take time and energy, the use of digital games and

simulations can have a positive effect on the way teachers teach to match the way students' learn.

In order to explore digital games and simulations as effective tools, more research needs to be completed on how business teachers can effectively implement them into the classroom. Specifically, research will need to be conducted on how educators can evaluate digital tools for their effectiveness. Different business digital games and simulations should be explored to help teachers narrow down specific ones to use with their curriculum. Ideas on how to assess students when using digital games and simulations will need to be studied and presented to teachers. Digital games and simulations give students opportunities to develop critical thinking skills by solving real-world business problems based on what they have learned. Once teachers understand the potential of these tools, students' learning will be transformed to properly train them for the 21st century workplace.

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