Games & Their Potential to Innovate Pedagogy to be Better Suited for Modern-Day Students

Introduction

Games possess an incredible power to captivate and engage. They not only capture the attention of countless people all over the United States, but they also motivate them to invest enormous amounts of time and effort into whatever action or activity the game calls for. Indeed, according to a study published by two researchers of Carnegie Mellon University, a top-tier global research university, "by age 21, the average American has spent more than 10,000 hours playing such games."[1] That number is quite significant considering that "10,080 hours is the exact amount of time [a student] will spend in school from fifth grade to high school graduation if [he/she has] perfect attendance."[2] Furthermore, the games these people play are completely voluntary while school is not, yet people still invest such an immense amount of their spare time into games. Additionally, schools face difficulty attaining the same high results of engagement and willingness from students as games do.[3] However, according to Phillip Schlechty in his distinguished, best-selling book, *Engaging Students: The Next Level of Working on the Work,* engagement and motivation are integral qualities of a "good learner." Students engaged in what they are learning apply themselves much more than if they were merely "compliant," and as a result, those engaged students benefit and retain much more from school and learning than non-engaged students, especially in this modern era.[4]

Therefore, by understanding games and their ability to engage and motivate people as well as the reasons why people gravitate towards them, the qualities of games may potentially be applied to pedagogy in order to allow for education to best adapt to the mindsets of modern-day students. Nevertheless, trying to merge such distinctly separate entities like games and schools may create challenges and have limitations in regards to implementation and success. Accordingly, this research report will analyze games and the qualities that attribute to their appeal and engagement and will examine and consider the implications and limitations associated with applying the aforementioned characteristics of games to education in order to answer the question: Can games be used to innovate pedagogy to be better suited for modern-day students?

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[1] Von Ahn, Luis, and Laura Dabbish. "Designing Games with a Purpose." *Communications of the ACM* 51, no. 8 (August 2008): 58-67. Accessed March 20, 2015. https://www.cs.cmu.edu/~biglou/GWAP_CACM.pdf.

[2] McGonigal, Jane. *Reality is Broken: Why Games Make Us Better and How They Can Change the World.* New York: The Penguin Press, 2011.

[3] Ibid.

[4] Schlechty, Phillip C. *Engaging Students: The Next Level of Working on the Work.* San Francisco: John Wiley & Sons, 2011.

Games vs Traditional School

Firstly, why does the youth of today spend such a significant amount of time playing games? After all, that time could have been utilized for tasks often deemed as more productive and rewarding such as studying or working. However, for gamers, playing games actually *is* productive and rewarding.[5] This notion stems from the fact that games inherently "tap into the brain's natural reward circuitry."[6] As stated in a peer-reviewed article written by notable neuroscientist Jaak Panksepp, this reward system "provokes intense and enthusiastic exploration and appetitive anticipatory excitement/learning."[7] That is, people become much more motivated, engaged, and willing to learn and explore when they receive rewards or compensation for their actions because those incentives instill in them the notion that what they did had purpose or meaning. As a result, games, which constantly dangle the promise of rewards (e.g., points, progress bars, stats, and levels) in front of a player, induce higher feelings of meaning and significance than often can be found in the real world.[8] Furthermore, because people constantly attain these rewards throughout games, their brains see those rewards as indications of productivity, thus encouraging themselves to continue putting time and effort into games in order to reap more and more rewards.

The real world, on the other hand, does not constantly provide its inhabitants with feedback and rewards like games do, and the real world often lacks indicators of progress and productivity. This occurrence is due to the fact that game design has advanced and is advancing so much to appeal to humans and human nature that reality has a difficult time competing.[9] As a result, the real world does not hold the same appeal of games, and thus, people are more likely to spend more time on games in an attempt to appease their natural desire to be rewarded and to feel productive. Schools often suffer from this lack of appeal as well, especially in the eyes of modern-day students.[10] Modern-day students, due to the fact that they have grown up in a world where games are so advanced and easy to attain, "take high-intensity engagement and active

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[5] McGonigal, Jane. *Reality is Broken: Why Games Make Us Better and How They Can Change the World.* New York: The Penguin Press, 2011.

[6] Johnson, Steven. *Everything Bad is Good for You: How Today's Popular Culture is Actually Making Us Smarter.* New York: Riverhead, 2006.

[7] Panksepp, Jaak. "Affective Neuroscience of the Emotional BrainMind: Evolutionary Perspectives and Implications for Understanding Depression." *Dialogues in Clinical Neuroscience* 12, no. 4 (December 2010): 533-45. Accessed March 20, 2015. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3181986/.

[8] McGonigal, Jane. *Reality is Broken: Why Games Make Us Better and How They Can Change the World.* New York: The Penguin Press, 2011.

[9] Ibid.

[10] Gee, James Paul. *The Anti-Education Era: Creating Smarter Students through Digital Learning.* New York: Palgrave Macmillan, 2013.

participation [that those games provide] for granted."[11] Consequently, by being accustomed to this engaging and motivating quality of games, their attitudes toward traditional pedagogy suffer. After all, traditional schooling involves work and assignments that are state-mandated and that discourage failure by punishing it. Rather than providing incentives and encouragement, traditional pedagogy utilizes the fear of retribution to push students to learn. Furthermore, traditional schools require students to study and learn, but they often do not give students reasons that are compelling or meaningful enough to make them want to learn without prompting. Additionally, schools often issue worksheets, textbooks, and tests, all with fixed and standardized facts and information, that do not stimulate a student's desire to think critically or problem-solve.[12] As a result, traditional schools often cause "negative stress" for students while also putting them in "low-motivation, low-feedback, and low-challenge environments."[13]

On the other hand, games place students in environments where they are given meaning for their actions and where they can fail without fear of negative consequences. Games, after all, with their resets, revivals, start overs, and replays, do not have to end at "game over." In fact, "gamers spend nearly all of their time failing," with failure occurring "roughly four times out of five" according to Nicole Lazzaro, a "game-play emotion" expert and game researcher with over twenty years of experience in the game-designing industry.[14] What is different with failure in games though is the fact that players have the chance to try and try again. This trial and error allows players to gain experience and to utilize that experience each and every time so that they can better increase their ability to overcome the challenges that they are facing. After all, as philosopher John Locke stated in his work, *An Essay Concerning Human Understanding Of Ideas,* "[a]ll ideas come from sensation or reflection" and must be gleaned through experience and observation. If one does not experience or think of something, then he/she cannot know of its existence.[15] Thus, trial and error, which exposes people to new experiences and allows them to build upon their knowledge over and over again until they can figure out an answer or conclusion, utilizes Locke's notion that experience leads people to ideas.[16] As a result, by allowing and encouraging trial and error, games push people to constantly gain new information that can be employed to form new ideas thus stimulating learning as well as critical thinking and problem solving. Schools, on the other hand, give failure a negative connotation and often see it

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[11] McGonigal, Jane. *Reality is Broken: Why Games Make Us Better and How They Can Change the World.* New York: The Penguin Press, 2011.

[12] Gee, James Paul. *The Anti-Education Era: Creating Smarter Students through Digital Learning.* New York: Palgrave Macmillan, 2013.

[13] McGonigal, Jane. *Reality is Broken: Why Games Make Us Better and How They Can Change the World.* New York: The Penguin Press, 2011.

[14] Ibid.

[15] Locke, John. "Of Ideas in General, and Their Original." In *Book II: Locke's Essay Concerning Human Understanding of Ideas,* 32-34. New York: The College Board, 2015.

[16] Ibid.

as inadequate and unsatisfactory. State-mandated standards and standardized testing also play a role in discouraging failure by deeming grades that do not meet standards as "below average."

Therefore, games appeal to students due to their reward systems, engaging and meaningful qualities, voluntary participation, environments where failure is allowed, and encouragement of trial and error, all of which traditional schools do not often possess or allow. By utilizing these characteristics of games, pedagogy may potentially improve to better fit the needs of the modern-student.

Applying Games to Pedagogy

There are several ways to utilize games and/or the qualities of games in pedagogy. These methods range from game-based learning to gamification to using game supplements to any combination in-between.

Game-based learning involves the use of actual games for instructional purposes.[17] These games contain material that connect with the subject being taught. For instance, games made purely for educational purposes, such as "Vanderbilt University's SURGE, Filament Games's Reach for the Sun, Adam Gazzaley's NeuroRacer, and [Games Learning Society's] Econauts," that utilize "situated learning theory" have large potential to be used within several different subjects in game-based learning.[18] Additionally, "content-rich" commercial games such as *Civilization* have potential to be of use.[19]

Gamification utilizes "gaming elements and dynamics" to help engage and motivate people to complete tasks and goals.[20] This method of instruction does not use actual games. Instead, it uses characteristics and qualities of games such as points, levels, quests, and avatars to encourage people to do certain activities. For instance, a widely used and successful example of gamification in learning and education is the non-profit organization Khan Academy, which utilizes game characteristics such as points, badges, and masteries to encourage learning.[21]

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[17] Woo, Jeng-Chung. "Digital Game-Based Learning Supports Student Motivation, Cognitive Success, and Performance Outcomes." *Journal Of Educational Technology & Society* 17, no. 3 (July 2014): 291-307. Accessed March 21, 2015. Academic Search Complete, EBSCOhost.
[18] Squire, Kurt. "Creating the Future of Games & Learning." *Independent School* 74, no. 2 (Winter 2015): 86-90. Accessed March 21, 2015. Academic Search Complete, EBSCOhost.
[19] Glazer, Sarah. "Video Games: Do They Have Educational Value?"*CQ Researcher* 16, no. 40 (November 2006): 937-60. Accessed March 21, 2015. http://olpglobalkids.org/pdfs/cqr20061110c.pdf.
[20] Kim, Bohyun. "Gamification." *Library Technology Reports* 51, no. 2 (February 2015): 10-16. Accessed March 21, 2015. Academic Search Complete, EBSCOhost.
[21] Khan Academy. *Khan Academy.* Accessed March 22, 2015. https://www.khanacademy.org/.

Using game supplements rather than completely changing the pedagogy is another method that can help engage students more in their coursework. When applicable, games can be brought in to help in the learning and understanding of certain topics. For example, games such as *Oregon Trail*, *Jeopardy,* and *SimCity* could be used in various subjects to enhance the learning process.[22]

With all of these possible uses of games within education, pedagogy may potentially become more engaging for and appealing to students. However, integrating games into learning also has potential limitations that need to be investigated in order to attain a conclusion derived from careful consideration of all implications and limitations.

The Limitations of Integrating Games into Learning

One limitation that any game may potentially face, whether it is an educational game or a recreational game, is that it may lose its appeal over time. Games, after all, do not hold one's attention indefinitely. A game may become too difficult and thus not worth the effort, or it may become too easy and thus not as rewarding. Either way, the potential for games to decrease in effectiveness is definitely a limitation for games in pedagogy that will demand the continued advancement in game design as well as the use of different and varied games in order to keep students interested and engaged.

In addition to the fact that students may lose interest in a game over time, students may not even be interested in a game in the first place. After all, the tastes and preferences of each student may vary, and some students may not see the appeal of certain types of games, thus preventing them from fully utilizing the learning experiences that games can provide. Furthermore, as reported by science journalist Dan Hurley in his article published in *The New York Times*, even if people have the opportunity to improve their own intelligence and even if that opportunity is in the form of a game, some just may not be interested enough to partake in that opportunity.[23]

Consequently, integrating games into learning not only faces the problem of having to appeal to a variety of students, all with their own different interests, but also faces the challenge of finding actual games that can be of use. After all, the game industry, although booming, comprises mostly of recreational games rather than educational games. Indeed, "[h]igh costs and

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[22] Takeuchi, Lori M., and Sarah Vaala. *Level Up Learning: a National Survey on Teaching with Digital Games.* New York: The Joan Ganz Cooney Center at Sesame Workshop, 2014. Accessed March 21, 2015. http://www.joanganzcooneycenter.org/wp-content/uploads/2014/10/jgcc_leveluplearning_final.pdf.
[23] Hurley, Dan. "Can You Make Yourself Smarter?" *The New York Times*, April 18, 2012. Accessed March 21, 2015. http://www.nytimes.com/2012/04/22/magazine/can-you-make-yourself-smarter.html?_r=0.

an uncertain market make production of purely educational games too risky for private industry to develop" as concluded by a report published by the Federation of American Scientists.[24] Moreover, certain subjects may find less games available for use due to the nature of the subject matter. As a result, difficulty finding games that can be utilized is certainly a limitation of trying to integrate games into learning.

Furthermore, teachers themselves may face difficulties when implementing games into the classroom. According to a recent national survey published in 2014, teachers who use games in class and teachers who do not use games both attributed barriers such as "insufficient time," "costs," "not sure where to find quality games," "not sure how to integrate games," and "hard to find games that fit curriculum" as the greatest barriers that teachers face when using digital games in classrooms.[25]

Thus, although games in theory possess attributes that may aid students in becoming more motivated and engaged in learning, there are still limitations such as students losing interest or not being interested, difficulty finding games, challenges for teachers, insufficient time, and costs that need to be taken into account when attempting to innovate pedagogy through the use of games or the characteristics of games.

Conclusion

Therefore, including games within education is not always the best choice. In certain situations, they can be viable means of engaging and motivating students, but games do not completely solve the issues that schools face with engaging students in learning. There are problems such as student loss or lack of interest, trouble finding and utilizing games, and lack of resources available that limit the potential of games in education. Consequently, games should not be used in all aspects of education, rather, they should be used as a supplement to instruction when viable, since they can improve learning and engagement when used in applicable situations.

However, actual games aside, the attributes of games that make them appealing to students can indeed be utilized to innovate pedagogy. The ideas themselves are worthwhile to investigate and employ into education. After all, games themselves do not need to be used in order to gain their benefits. Similar to how gamification works, adding aspects such as indicators

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[24] Glazer, Sarah. "Video Games: Do They Have Educational Value?"*CQ Researcher* 16, no. 40 (November 2006): 937-60. Accessed March 21, 2015. http://olpglobalkids.org/pdfs/cqr20061110c.pdf.

[25] Takeuchi, Lori M., and Sarah Vaala. *Level Up Learning: a National Survey on Teaching with Digital Games.* New York: The Joan Ganz Cooney Center at Sesame Workshop, 2014. Accessed March 21, 2015. http://www.joanganzcooneycenter.org/wp-content/uploads/2014/10/jgcc_leveluplearning_final.pdf.

of progress, meaningful work, and chances for trial and error all encourage students and do not have to immensely alter the way teaching is done.

Thus, by adding games to learning when viable and by innovating pedagogy to integrate game qualities such as reward systems, meaningful work, and the promotion of trial and error, pedagogy can adapt to better suit the needs of modern-day students so that school, for them, can become more engaging, meaningful, appealing, and enjoyable.

(2,251 words)

Annotated Bibliography

Gee, James Paul. *The Anti-Education Era: Creating Smarter Students through Digital Learning.* New York: Palgrave Macmillan, 2013.

This book, written by James Paul Gee, a Presidential Professor of Literary Studies at Arizona State University who has also arranged a national conversation on games and learning for the White House Office of Science and Technology, provided a comprehensive analysis of modern education as well as culture and what needs to happen to improve how learning occurs so that humans as a whole can benefit from the true potential of modern-day education.

Glazer, Sarah. "Video Games: Do They Have Educational Value?"*CQ Researcher* 16, no. 40 (November 2006): 937-60. Accessed March 21, 2015. http://olpglobalkids.org/pdfs/cqr20061110c.pdf.

This article provided an in-depth discussion of the educational value of video games as well as included a wide array of perspectives and lenses regarding the use of video games in education. Additionally, this article brought in the points of view of several credible sources from professors such as James Paul Gee, a Professor of Reading at the University of Wisconsin (at the time this article was published) and Howard Gardner, a Hobbs Professor of Cognition and Education at Harvard, to reports such as ones conducted by the Federation of American Scientist and the MacArthur Foundation.

Hurley, Dan. "Can You Make Yourself Smarter?" *The New York Times*, April 18, 2012. Accessed March 21, 2015. http://www.nytimes.com/2012/04/22/magazine/can-you-make-yourself-smarter.html?_r=0.

This newspaper article, published by *The New York Times*, drew information from several studies conducted by neuroscientists, intelligence researchers, and cognitive psychologists in order to determine whether one can make himself/herself smarter by training through games. This article provided information reported and concluded from analysis of several scientific studies regarding intelligence as well as factors such as motivation and effectiveness that play key roles in allowing humans to improve their intelligence.

Joan Ganz Cooney Center. *The Joan Ganz Cooney Center at Sesame Workshop.* Accessed March 21, 2015. http://www.joanganzcooneycenter.org/about-us/.

This source was used to help determine the validity of the survey titled "Level Up Learning: a National Survey on Teaching with Digital Games," which was used in this research report.

Johnson, Steven. *Everything Bad is Good for You: How Today's Popular Culture is Actually Making Us Smarter.* New York: Riverhead, 2006.

> This book, written by Steven Johnson, provided a perspective on the topic of video games that included points and information often overlooked by the general public. This inclusion of a different perspective that still contains backing from scientific research, such as from neuroscientist Jaak Panksepp, allowed this research report to contain a wide-array of perspectives and points of view.

Khan Academy. *Khan Academy.* Accessed March 22, 2015. https://www.khanacademy.org/.

> This source was used to provide an example of a successful and widely-used educational program that utilized gamification.

Kim, Bohyun. "Gamification." *Library Technology Reports* 51, no. 2 (February 2015): 10-16. Accessed March 21, 2015. Academic Search Complete, EBSCOhost.

> This peer-reviewed article, which was published in academic journal *Library Technology Reports*, provided information about and examples of gamification in the real world as well as analysis for and comparison between game-based learning and gamification. Furthermore, this article was recently published in February 2015 thus improving its relevance. The relevance of this article in addition to it being peer-reviewed by other experts of the field increases its credibility and viability as a source.

Locke, John. "Of Ideas in General, and Their Original." In *Book II: Locke's Essay Concerning Human Understanding of Ideas*, 32-34. New York: The College Board, 2015.

> This source, written by renowned philosopher John Locke, provided information regarding human nature and the way people come up with and develop ideas. Additionally, this source provided useful analysis regarding why experience, observation, and sensation are key to the formation of ideas, thoughts, and connections between concepts.

McGonigal, Jane. *Reality is Broken: Why Games Make Us Better and How They Can Change the World.* New York: The Penguin Press, 2011.

> This book, written by Jane McGonigal, provided an in-depth analysis of games and the reasons for their appeal as well as the potential for games and their features to improve the world as a whole. Additionally, this book included research and data from a multitude of viable sources ranging from books to research reports to peer-reviewed articles.

Panksepp, Jaak. "Affective Neuroscience of the Emotional BrainMind: Evolutionary Perspectives and Implications for Understanding Depression." *Dialogues in Clinical*

Neuroscience 12, no. 4 (December 2010): 533-45. Accessed March 20, 2015.
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3181986/.

This peer-reviewed article, published in *Dialogues in Clinical Neuroscience*, a quarterly
peer-reviewed publication, provided research to explain the reasons behind the brain's
reward system which gives humans a tendency to gravitate towards rewards and
compensation. Additionally, this article explained why the aforementioned factors induce
feelings of engagement and motivation in certain activities or tasks.

Schlechty, Phillip C. *Engaging Students: The Next Level of Working on the Work.* San Francisco:
John Wiley & Sons, 2011.

This book, written by Phillip Schlechty, founder of the Schlechty Center, a private
non-profit organization dedicated to helping educators improve pedagogy and learning,
analyzes and discusses the factors, such as motivation and meaning, that play integral
roles in student engagement and performance. This book also provides an in-depth
analysis of student perspectives and the reasons that modern-day students often do not
feel engaged or motivated to apply themselves in school.

Servier Research Group. *Dialogues in Clinical Neuroscience.* Accessed March 23, 2015.
http://www.dialogues-cns.org/about/.

This source was used to determine the credibility of the journal, *Dialogues in Clinical
Neuroscience,* which published the peer-reviewed article titled "Affective Neuroscience
of the Emotional BrainMind: Evolutionary Perspectives and Implications for
Understanding Depression" that was used in this research report.

Squire, Kurt. "Creating the Future of Games & Learning." *Independent School* 74, no. 2 (Winter
2015): 86-90. Accessed March 21, 2015. Academic Search Complete, EBSCOhost.

This article discusses the emergence of games in modern day learning as well as the
factors that have contributed and are contributing to its rise. Additionally, this article
analyzes the implications as well as the limitations of the integration of games in
pedagogy and education today and in the future. As for this article's credibility, it was
published recently in 2015, thus making it a relevant and viable source. Additionally, it
was written by professor and researcher Kurt Squire, who has published many other
works discussing games and education in various academic journals and periodicals.

Takeuchi, Lori M., and Sarah Vaala. *Level Up Learning: a National Survey on Teaching with
Digital Games.* New York: The Joan Ganz Cooney Center at Sesame Workshop, 2014.
Accessed March 21, 2015.
http://www.joanganzcooneycenter.org/wp-content/uploads/2014/10/jgcc_leveluplearning
_final.pdf.

This national survey, which was published by the Joan Ganz Cooney Center, a research lab dealing with the innovation of education, provided data and statistics regarding teaching and digital games across the United States. Furthermore, this report was published in 2014 thus improving its relevance and viability as a source.

TED Conferences, LLC. "Steven Johnson." *TED*. TED Conferences, LLC. Accessed March 23, 2015. https://www.ted.com/speakers/steven_johnson.

This source provided information about Steven Johnson, who wrote the book, *Everything Bad is Good for You: How Today's Popular Culture is Actually Making Us Smarter,* that was utilized within this essay in order to determine the credibility of said book. Furthermore, this source was on the TED website, which is known as a

Von Ahn, Luis, and Laura Dabbish. "Designing Games with a Purpose." *Communications of the ACM* 51, no. 8 (August 2008): 58-67. Accessed March 20, 2015. https://www.cs.cmu.edu/~biglou/GWAP_CACM.pdf.

This article, published by two researchers of top-tier research university, Carnegie Mellon University, provided information regarding games and their prominence in the United States. Additionally, this article analyzed games and provided a potential solution to increase the progress of AI algorithms through the use of games and the people who play games thus demonstrating a way that games can have other applications other than entertainment and recreation.

Woo, Jeng-Chung. "Digital Game-Based Learning Supports Student Motivation, Cognitive Success, and Performance Outcomes." *Journal of Educational Technology & Society* 17, no. 3 (July 2014): 291-307. Accessed March 21, 2015. Academic Search Complete, EBSCOhost.

This peer-reviewed article, published by the *Journal of Educational Technology & Society*, provided information about game-based learning and the potential that it contains as a new form of pedagogy. Additionally, this article included a study which tested the effectiveness of game-based learning with 63 university students over the course of eight weeks and found that game-based learning did support student motivation, cognitive success, and performance outcomes in this particular experiment.