The Impact of Web-Based Game Play on Soft Skills Education

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Introduction

Youth transitioning from high school, post-secondary education, and vocational training to the workforce face a number of challenges finding and keeping a job. In addition to education and experience requirements, employers are increasingly looking for new hires with "soft skills" such as communication and professionalism (Osterman, 2005). As soft skills become more important to employers, it is necessary to include soft skills acquisition as an educational priority to ensure greater preparedness for the workplace.

To help fill this need, many tools and curricula have been created to support the development of soft skills within youth. Included among them is the United States Department of Labor's Office of Disability Employment Policy's comprehensive curriculum, _Skills to Pay the Bills_. It aims to help youth with and without disabilities in integrated settings to develop soft skills in the areas of communication, networking, enthusiasm and attitude, problem-solving and critical thinking, and professionalism.

Web-based educational games have been widely used by the workforce development system, employers, and technical education providers to teach job seekers and workers "hard" skills, or skills that employees must have to perform essential tasks of a job. They have also been increasingly used within the education system to teach subjects like reading, math, and science. Web-based educational games are video games with a purpose. Sometimes called "serious" games, they are gaining traction as educational tools. Given electronic games' popularity, ODEP sought to determine if electronic games have been used in schools and in pre-employment programs to teach youth with and without disabilities soft skills and to determine their effectiveness. ODEP consequently produced a literature review of existing research on electronic games and soft skills.

This brief provides an overview on the existing research to date on educational games for youth, soft skills and educational games, and research on educational games for youth with disabilities.

Research on Games and Soft Skills Outcomes

With educational games on the rise, there are new research projects, organizations, grants, and studies emerging to explore "new visions for game-based technologies for learning" (Squire, 2008). Recently, the John D. and Catherine T. MacArthur Foundation, in collaboration with the Bill and Melinda Gates Foundation, donated $10.3 million dollars to the GLASS Lab Project, to research and develop educational games (_GLASS Lab_, 2012). The National Science Foundation's "Cyberlearning: Transforming Education" initiative is another example of institutional enthusiasm and support for educational games, with millions of dollars in grant money available for research concerning games and other technological advances in education

(http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503581). Companies such as IBM are also jumping into the mix with their Innov8 game, meant to help business professionals use web-based games to learn how to make business process improvements (http://www-01.ibm.com).

The increasing prominence of educational games follows an increase in video game use in American society. In a 2008 report from the Pew Internet and American Life Project, a survey of 1,102 youth shows that 97 percent of American teens play some kind of video game (Lenhart, et al. 2008). A 2011 report from the NPD group reported 64 million gamers between the ages of 2-17, with the number of gamers rising faster than population growth (NPD Group, 2011). Educators have watched this trend develop for decades, and have tapped into this activity by incorporating educational games into the classroom. These games are called "Serious Games" because they are developed with a primary purpose other than pure entertainment (Bers, 2010). In primary education, serious games are used to teach skills like math and reading, and are also making their way into science and physical education classes (Young, et al. 2012). In the workplace, serious games are used for training in many types of jobs, including in medicine and the military. Hundreds of top companies have now integrated games into their training procedures, including American Express, Bank of America Corporation, and Nokia (http://www.theesa.com/games-improving-what-matters/workplace.asp).

Despite this momentum, there has been little research on the effectiveness of web-based games. In 2005, the Federation of American Scientists, the Entertainment Software Association, and the National Science Foundation convened a National Summit on Educational Games to "discuss ways to accelerate the development, commercialization, and deployment of new generation games for learning" (*Summit,* 2006). The summit report noted a "chicken and egg" dilemma: "When schools cannot or will not use unproven educational innovations, there may be no population of students using the innovation to test its efficacy. And without data to prove efficacy, the technology or innovation is unlikely to be adopted." (*Summit,* 2006).

Games to teach soft skills fall into this paradox. Further, currently there are not many games available focused on developing soft skills. For example, in one of the largest meta-analysis of research related to gaming outcomes, Connolly, et al. found only one study that reported outcomes related to soft skills (2012). The analysis identified over 7,000 papers related to gaming outcomes and found 129 papers reported empirical evidence. The 129 papers were published between January 2004 and January 2009 and included participants ages 14 and older. The study concerning soft skills was published in 2008 and found that students who used a driving simulator based serious game as a part of their driving instruction had increased self efficacy when compared with students who received traditional driving instruction. The authors of the study attribute this increased self-efficacy to the interaction the driving students have with the game's feedback system as they are learning. (Backlund, et al. 2008) The paper formally defines self-efficacy as: "…people's beliefs in their capabilities to produce desired effects by their own actions. Importantly, self-efficacy does not refer to specific skills or self esteem (although there are strong associations), but to the notion of how one perceives and manages one's personal resources to attain desired goals."

The link between self-efficacy and soft skills becomes apparent in game playing because games:

> …become effective for learning when the gap between game-specific skills and
> real-life applications is bridged by the ability to generalize – comprehend and

reapply – one's knowledge fitting the situation. For instance, the task of driving a car is not exactly the same in a driving simulator as in real life, since a simulation is only one representation of what it is like to drive a car, under more or less constrained conditions. But if self-efficacy for driving a car in real life is promoted by driving in a simulator, by making the driver more *attentive, judicious, etc*, as reflected in an actual improvement of performance, then there is learning above the limitations of the simulator...." (Backlund, et al. 2008; emphasis added)

Although driving could be described as a "hard skill," this study provides some evidence that soft skills can be learned through games and applied in the real world. Students learned soft skills such as attentiveness and judiciousness through the simulator and applied them above and beyond the game. This in turn promoted their self-efficacy and made them more confident drivers.

Despite the shortage of empirical evidence, there are proponents who strongly believe that educational games can build soft skills because skill building requires practice, and games provide opportunities for practice and experiential learning. Kotlyar and Saks write that simulation-based games could be very effective for teaching soft skills because they would allow students the chance to practice common interaction types in the workplace. They argue that practice is especially important in the case of soft skills because emotions tend to accompany interpersonal interactions and thus make it harder to follow learned rules. Additionally, the successful use of many soft skills depends on reading the cues that other people send, which is also a skill that must be practiced.

Researchers Morgan and Adams believe that it is possible to teach soft skills using e-learning techniques, including games (2009). They observe that learning soft skills requires a "fundamentally different" approach from learning technical hard skills. They believe that most e-learning technology is currently created in the "first generation" paradigm, which puts the instructor (or game) in charge of the learning, and basically follows a linear path through the topics. Evaluation is based on memorization and passing a test. The researchers argue that a second generation paradigm is needed in order to successfully teach soft skills in an e-learning environment. The second generation approach would be learner-driven, integrate theory and practice, and be more flexible to account for the complexity inherent in soft skills situations, like management or teamwork. According to Morgan and Adams, with the right approach it would be possible to use games to teach soft skills.

Simulations can be considered an example of Morgan and Adams' "second generation approach." In "Games vs. Simulations: When Simulations May be a Better Approach," Andy Petroski draws a distinction between games and simulations, and recommends simulations as a learning tool for soft skill development (2012). There are several benefits of simulations, including the following:
- First- or second-person perspective which creates more attachment to in-game consequences.
- Simulations are built around real-life scenarios that are more easily transferable to the real world.
- Information governs play so that users are utilizing available information to make decisions.
- Feedback can be delayed until after a series of decisions.

Petroski believes that for these reasons, simulations may be ideal for teaching soft skills such as communication and decision making. However, he notes that soft skills are difficult to teach, and may be the most difficult type of simulation to do well.

Other Research on Educational Games

In addition to research specifically on using games to teach soft skills, some of the more general research on serious games can shed light on the question of whether or not using web-based games to teach soft skills can be effective.

In one early study on student motivation, students with disabilities were divided into two groups to learn vocabulary skills involving matching prefixes to root words (Malouf, 1988). Both groups received instruction via computer software; for one group it was a game, and for the other group it was the same content, but without game features. Student motivation was measured the next day when students had the opportunity to engage in a free-choice activity. Researchers found that although students from both groups showed an equal performance in task skills (about 85 percent accuracy), the students who had played the game version showed a significant increase in motivation to work on the same types of problems during their free-choice activity, doing twice as many prefix problems as the non-game group.

In a similar study conducted more than 20 years later, researchers in Greece tested the learning effectiveness and motivational appeal of a computer game targeted at the learning of computer memory concepts (Papastergiou, 2009). Students were divided into two groups, with one group using gaming software, and the other using non-gaming software. In this case, student motivation was again determined to be higher in the gaming group. However unlike the prefix study examined above, performance was also shown to be significantly higher in the gaming group.

In a more recent study, cognitive and motivational outcomes were also reported, but with different results. Researchers tested the effectiveness of a game called Frequency 1550 that was created to teach students historical knowledge of medieval Amsterdam (Huizenga, 2009). They provided the mobile history game to 10 classes, while another 10 classes received a regular lesson series. Results of the experiment showed that students who played the game gained significantly more knowledge than students who did not play the game. But unlike the two studies examined above, "No significant differences were found between the two groups with respect to motivation for History or the Middle Ages."

Two of these three studies show that students were more motivated about the subject matter when they learned via games. Two out of the three studies also showed greater cognitive outcomes in the group that played games. Differences in the results of these three studies can be attributed to variances in the studies such as different games, different content, and different research methods. O'Neil, classifying the outcomes of computer games research notes, "Our position is that games themselves are not sufficient for learning, but there are elements in games that can be activated within an instructional context that may enhance the learning process." The overall context surrounding game playing, including teacher instruction, guidance, and out-of-game learning, has an impact on the effectiveness of a game (O'Neil, et al. 2005).

Research on Educational Games for Students with Disabilities

A recent survey of over 13,0000 casual (i.e., non-professional) gamers by Information Solutions Group on behalf of PopCap Games reports that more than 1 in 5 casual gamers have a physical, mental, or developmental disability (*Survey,* 2008). Players with disabilities also play casual games more often than players without disabilities- 64 percent play casual games daily as compared with 57 percent of casual game players overall. Of the players who self-reported having a disability, 94 percent of them noted "physical or mental benefits" associated with gaming, and 77 percent reported "additional benefits over and above what a typical non-disabled player might experience." These additional benefits included feelings of belonging, distraction from pain, mood lifting, mental workouts, and improved concentration. The prevalence of game usage for individuals with disabilities, along with the possibility that gaming provides additional benefits, suggests that incorporating games into education, workforce development, and career readiness programs may be a promising strategy to promote long-term career success.

"Problem Based Learning Software for Students with Disabilities," author Debra Cote posits that problem-based learning (PBL) software should be utilized to help students with disabilities to develop critical thinking and problem-solving skills (2007). Problem-based learning is a method where students learn about a subject through problem solving, which teaches both thinking skills and knowledge. She writes that through the use of PBL software,

> "…students identify their strengths and weaknesses, thereby learning self-direction and goal setting. The incorporation of PBL software helps students develop an action plan to accomplish set goals in a nonthreatening atmosphere. Students who are self-aware learn that they have the ability to reach their goals and are in a better position to discover how those around them may or may not influence their ability to reach their goals."

Critical thinking, self-direction, and goal setting are all soft skills that Cote believes can be taught through problem-based learning software, including games and simulations. She also notes additional benefits to incorporating e-learning into curriculum for students with disabilities, including increased competitiveness in a job market that values not only soft skills, but also technological competency (Cote, 2007).

Conclusion

Games have only been used to teach soft skills to a limited extent. Although research done to date indicates that in at least some cases web-based games have been used to successfully teach soft skills, more research is needed to examine whether or not they are effective.

There is significant enthusiasm for educational games among youth both with and without disabilities. The opportunity to incorporate learning activities that will motivate and engage students in their education and career readiness cannot be understated. This especially applies to soft skills education, which is difficult to teach in any context (Office of Disability Employment Policy, Skills to Pay the Bills). Game developers should determine how to create games that effectively teach soft skills and how best to integrate them into curricula in order to maximize their effectiveness. Research will need to be conducted to show empirical outcomes of the effects of soft skills games, especially focusing on which aspects of games (including the context in which they are played)

contribute or detract from success. Developers should also ensure that games are accessible to all users, including those who utilize assistive technology, and that they are designed based on universal design for learning principles.

References

Backlund, Per, Mikael Lebram, Henrik Engstrom, Mikael Johannesson, and Bjorn Sjoden. "Designing for Self-Efficacy in a Game Based Simulator: An Experimental Study and Its Implications for Serious Games Design." Proc. of Visualization, 2008 International Conference, London. 106-13.

Bers, Marina Umaschi. "Let the Games Begin: Civic Playing on High-tech Consoles." *Review of General Psychology* 14.2 (2010): 147-53.

Connolly, Thomas M., Elizabeth A. Boyle, Ewan MacArthur, Thomas Hainey, and James M. Boyle. "A Systematic Literature Review of Empiricle Evidence on Computer Games and Serious Games." *Computers and Education* 59 (2012): 661-86. *Science Direct*. Sept. 2012.

Cote, Debra. "Problem-Based Learning Software for Students with Disabilities." *Intervention in School and Clinic* 43.1 (2007): 29-37. *ProQuest*. 2007.

"Games: Improving the Workplace." *ESA- Entertainment Software Association*. Web. 22 Mar. 2013. <http://www.theesa.com/games-improving-what-matters/workplace.asp>.

"Glass Lab; Groundbreaking Video Game Design Lab Will Research And Develop Video Games To Engage Students And Measure Learning." *Computer Weekly News* 12 July 2012: 985.

Huizenga, J., W. Admiraal, S. Akkerman, and G. ten Dam. "Mobile Game-based Learning in Secondary Education: Engagement, Motivation and Learning in a Mobile City Game."*Journal of Computer Assisted Learning* 25.4 (2009): 332-44.

"INNOV8 2.0." *IBM*. Web. 24 Dec. 2012. <http://www-01.ibm.com>.

Kotlyar, Igor, and Alan Saks. "The Hard Facts on Soft Skills and E-learning." *Canadian HR Reporter* 14.13 (2001): 13.

Lenhart, A., Kahne, J., Middaugh, E., MacGill, A., Evans, C., & Vitak, J. (2008). Teens, video games, and civics. Washington, DC: Pew Internet & American Life Project.

Malouf, D. B. "The Effect Of Instructional Computer Games On Continuing Student Motivation." *The Journal of Special Education* 21.4 (1988): 27-38. *SAGE Journals*.

Morgan, Gareth, and Jean Adams. "Pedagogy First: Making Web-TechnologiesWork."*Journal of Interactive Learning Research* 20.2 (2009): 129-55.

NPD Group. *The Video Game Industry Is Adding 2-17 Year-Old Gamers At A Rate Higher Than That Age Group's Population Growth*. 11 Oct. 2011. Web. 22 Mar. 2013. <https://www.npd.com/wps/portal/npd/us/news/press-releases/pr_111011/>.

Office of Disability Employment Policy. *Skills to Pay the Bills Mastering Soft Skills for Workplace Success*. (2012).

O'Neil, Harold F., Richard Wainess, and Eva L. Baker. "Classification of Learning Outcomes: Evidence from the Computer Games Literature." *Curriculum Journal* 16.4 (2005): 455-74.

Osterman, Rachel. "Attitudes Count: 'Soft Skills' Are What Area Employers Desire." *Knight Ridder Tribune Business News* [Sacramento] 23 May 2005, 1st ed.

Papastergiou, M. "Digital Game-Based Learning in High School Computer Science Education: Impact on Educational Effectiveness and Student Motivation." *Computers & Education* 52.1 (2009): 1-12. *ScienceDirect.com*. Jan. 2009.

Petroski, Andy. "Games vs. Simulations: When Simulations May Be a Better Approach." *T+D* 66.2 (2012): 3.

Squire, Kurt D. "Video Game–based Learning: An Emerging Paradigm for Instruction." *Performance Improvement Quarterly* 21.2 (2008): 7-36.

Summit on Educational Games: Harnessing the Power of Video Games for Learning. 2006. Federation of American Scientists Summit on Educational Games. Washington, DC.

Survey: 'Disabled Gamers' Comprise 20% of Casual Video Games Audience. 11 June 2008. PR Newswire.

US Labor Department's Office of Disability Employment Policy Releases Comprehensive

    Soft Skills Curriculum for Young Workers. 09 Feb. 2012. PR Newswire.

United States. National Science Foundation. *Cyberlearning: Transforming Education*. Web.

    22 Mar. 2013.

    http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503581>.

Young, Michael F., Andrew B. Cutter, Gerard Jalette, Greg Mullin, Benedict Lai, Zeus

    Simeoni, Matthew Tran, and Mariya Yukhymenko. "Our Princess Is in Another

    Castle: A Review of Trends in Serious Gaming for Education." *Review of Educational*

    Research 82.1 (2012): 61-89. *SAGE Journals*. 1 Feb. 2012.