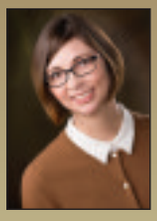
6-2015

Digital games for 21st–century learning: Teacher librarians' beliefs and practices

Amanda S. Hovious

Richard Van Eck
University of North Dakota, richard.vaneck@und.edu




" . . . experts on gaming and literacy consider librarians uniquely suited to promote literacy and learning through digital games . . ."

Digital Games for 21st-Century Learning

Teacher Librarians' Beliefs and Practices

AMANDA S. HOVIOUS AND RICHARD N. VAN ECK

ABSTRACT

Video games as tools for learning in K–12 have been a topic of intense discussion over the past fifteen years. One area of focus has been on the integration of commercial off-the-shelf games in lesson plans. A predictive factor for the adoption and diffusion of this innovation is the attitudes or readiness of teachers. Yet while many studies have examined this with teachers themselves, teacher librarians (TLs) have largely been ignored, despite their key role in education and technology adoption in schools. This study examines the beliefs and practices of TLs concerning digital games as learning tools to determine if and how they differ from teachers with regard to games and learning. The Teachers' Attitudes toward Games (TATG) survey measured TLs' perceptions of barriers to using digital games. Findings suggest that TLs tend to use digital games to address discrete library skills, although there is evidence that some use games to integrate twenty-first-century skills into classroom lessons. Similar to findings on classroom teachers, TLs perceived lack of time, lack of infrastructure, and lack of support as barriers to using digital games.

INTRODUCTION

Digital games can be good twenty-first-century learning tools because they share similar characteristics with successful learning environments—they are active, goal oriented, contextualized, adaptive, and feedback oriented (Shute, Rieber, & Van Eck, 2011). Moreover, a connection between digital gameplay and school-based literacy practices has been made (Gee, 2007). As a result, experts on gaming and literacy consider librarians uniquely suited to promote literacy and learning through digital games (Farmer & Murphy, 2010; Gee, 2012; Squire & Steinkuehler, 2005). TLs have the opportunity to promote the use of digital games to support twenty-first-century learning. Twenty-first-century learning can be defined in many ways but is most commonly thought of as work and life skills that include technology fluency and literacy, including such skills as critical thinking, problem solving, communication, collaboration, and societal awareness (Partnership for 21st Century Skills, 2009). One of the more widely accepted set of guidelines for twenty-first-century learning in education is found in the framework proposed by the Partnership for 21st Century Skills (2009). The American Association of School Librarians (AASL, 2007) has also set forth a similar set of standards. For the purposes of this paper, we adopt the definitions outlined in both documents and will refer to those skills collectively as 21CL.

While enthusiasm for digital games is growing, barriers may prevent TLs from promoting games as learning tools. Classroom teachers have been the primary focus of studies on using digital games, with commonly cited barriers including lack of time (Ertzberger, 2009; Gros, 2007), lack of infrastructure (Farmer & Murphy, 2010; Kenny & McDaniel, 2011), and lack of support (Baek, 2008; Ketelhut & Schifter, 2011). Similar studies on TLs are lacking, however, which has created a gap in the research. The purpose of this study is to examine TLs' perceptions of barriers to using digital games and compare them with those of classroom teachers.

THEORETICAL FRAMEWORK

The theoretical framework informing this research originates with Fullan and Stiegelbauer's (1991) theory of first- and second-order educational change, where the former change is external and incremental (e.g., systems, processes) and the latter internal and transformational (e.g., beliefs). Each kind of change requires a different approach. Brickner (1995) extends this idea to teaching innovation by proposing first- and second-order barriers, and Ertmer (1999) built upon this with barriers to technology integration practices. Because video games are a kind of technology integration, her model is a good foundation upon which to design an instrument. Barriers are a more predictive measure than the general construct of "attitudes," which has characterized past work in this area (e.g., Bingimlas, 2009; Kennedy-Clark, 2011; Kenny & McDaniel, 2011; Maddux & Johnson, 2010) because positive or negative attitudes could be equally attributable

Table 1. Sample of TLs' Digital Game-Based Lessons

Objective	Game	TL Role	Used By	Length
Learn how to put books in shelf order[1]	e.g., Order in the Library (S2S Utopia, 2004)	Designer	TL	10–60 minutes
Library orientation	Kahoot! (Kahoot, 2014)	Designer	TL	45 minutes
Learn the dangers of sharing pictures online	Internet safety game	Designer	TL	45 minutes
Keyboarding skills	Keyboard game	Designer	TL	20 minutes as filler
How to identify cyberbullying	Not identified	Designer	Teacher and TL	2 weeks
Search skills	21st Century Information Fluency (21CIF.com) search games	Designer	Teacher and TL	45 minutes
Create a product that represents their knowledge of the composer/explorer they were researching	MinecraftEdu (Teacher-Gaming, 2011)	Designer	Teacher and TL	1 month
Make a movie/build a Japanese tea house	Minecraft (Mojang, 2009)	Designer	Teacher and TL	10 lessons
Learn to identify a goal and prioritize resources to achieve it	City-building game	Designer	Teacher	3 days
Reading reinforcement	Starfall (Starfall Education, 2002–2014)	Collaborator	Teacher and TL	30 minutes
Work collaboratively to solve a mystery	Online art mystery	Collaborator	Teacher and TL	30 minutes

[1]Seven TLs described this type of lesson.

to first- or second-order barriers, and thus require different interventions.

METHOD

Convenience sampling was used, and TLs were recruited through several professional e-mail discussion forums, including the AASL forum (aaslforum@lists.ala.org), Information Literacy Discussion List (infolit@lists.ala.org), Reference and User Services Association List (rusa-l@lists.ala.org), and the Library Media Network Listserv (LM_NET@LISTSERV.SYR.EDU) sponsored by Syracuse University. The study included 221 participants, with 117 completing the study. The sample population was predominantly female, over the age of forty-five, and with media specialist licenses, which is representative of the overall TL population. They also tended to play casual games (e.g., Bejeweled, Candy Crush), which is reflective of gaming industry demographics.

The Teachers Attitude toward Games, or TATG, survey (Van Eck, 2013) measured TLs' attitudes about first- and second-order barriers to using digital games for learning. The survey assumed that TLs and teachers represent similar populations and, therefore, may hold similar beliefs about barriers to digital game adoption. The TATG consists of eighty-one Likert-type scale statements with eleven barrier subscales that are classified as first- or second-order barriers. There are no validity or reliability data available for the TATG, as it is currently being analyzed. TLs were also asked a series of open-ended questions about their experience using digital games in schools.

FINDINGS

How TLs Are Using Digital Games

Findings showed that approximately 42 percent of the TLs surveyed had used a digital game in library gaming initiatives, such as clubs, events, or collections. Participants largely indicated the purpose of their gaming initiatives as recreational or reward based. This is not a surprising finding since one of the purposes of the library is to support the social interests of patrons (Adams, 2009; Nicholson, 2010). The findings do support the argument that the school library is an ideal place to promote recreational gaming as a literacy activity in the same way it promotes recreational reading (e.g., Farmer & Murphy, 2010).

Approximately 41 percent of TLs had used digital games in a lesson. Two clear themes emerged from the analysis: (1) in lesson design, TLs played the role of designer, collaborator, or facilitator, reflecting their current job duties as teachers, collaborators, and technology supporters, respectively, and (2) there was a distinction between library instruction and classroom-integrated instruction. In library instruction, lessons were always designed by and for the TL. In classroom-integrated instruction, TLs served most often as collaborators or facilitators. Table 1 shows a representative sample of their digital

game-based lessons.

TLs' game choices for library instruction trended toward games that enabled practice of specific skills. For example, shelf order lessons used digital games such as Order in the Library (S2S Utopia, 2004) and Shelver (Mrs. Lodge's Library, 2013). Likewise, search lessons used a set of tutorials with games discretely divided by skill and concept (e.g., search process, search engines). Lesson length varied, although all fit within the timeframe of a single class period.

For classroom-integrated instruction, a greater variety of lessons was described in terms of 21CL (e.g., create, collaborate). Two lessons stood out in particular because each was designed by a TL. One TL designed a lesson that had students create a product in Minecraft (Mojang, 2009) representing their knowledge of a composer or explorer they were researching. Another TL used a city-building game to teach students the process of identifying a goal and prioritizing resources to achieve it. Both lessons took longer than a single class period, and both demonstrate the role TLs can play in using digital games for classroom-integrated instruction that supports 21CL.

There were notable differences in approaches between the lessons used in library instruction and classroom-integrated instruction, with a greater tendency toward behaviorist approaches (e.g., skills practice) in library instruction lessons. Time may be one factor that impacts TLs' choices of games for library instruction. Because TLs typically operate on a flexible scheduling basis, library-specific lesson planning may be challenging, possibly prompting TLs to focus more heavily on digital games that promote the practice of specific skills in a short period of time.

Another factor may be the nature of library skills themselves. While using the school library and its resources requires certain sets of skills, those skills are almost always applied in the context of classroom-related learning goals, hence the importance of collaboration in school librarianship. That concept is well demonstrated in the two examples of TLs who used Minecraft (Mojang, 2009) and a city-building game to integrate multiple literacies into classroom instruction. However, without collaborative relationships with teachers, TLs may perceive having little choice but to teach library skills in isolation. In that respect, choice of digital games becomes even more important for library skills. Specifically, the use of role-playing or strategy games would be beneficial because they situate learning within problem-solving contexts (Hung & Van Eck, 2010).

Responses to what made the lessons successful most frequently mentioned engagement, enjoyment, and interactivity. Reference to learning was less frequent. Those who did mention learning generally perceived the digital games as effective learning tools, with the exception of one TL who "didn't see much evidence of learning" in using a game to teach students book shelf order. Findings suggest that TLs may be more likely to perceive the value of digital games as engaging and motivating to students rather than recognizing the cognitive learning benefits from the gameplay itself. More experience with complex digital games may help TLs learn to recognize the cognitive processes that games promote. In fact, the TL who used the city-building game was one of the few survey participants who frequently played strategy games (> 5 hours per week).

Table 2. TATG Survey Results

Measure	M	SD	Likert
First-Order Barriers			
Access	18.78	3.32	3.76
Policies	12.71	3.31	3.17
Budget	12.96	3.75	3.24
Support	15.83	3.76	3.17
Difficulty	32.78	5.23	3.63
Time	19.39	4.18	3.24
Reliability	17.29	2.56	3.45
Second-Order Barriers			
Incentives	12.74	2.04	3.18
Confidence	35.35	6.55	3.54
Benefits	77.66	10.40	3.69
Drawbacks	29.01	5.22	3.23

Barriers to Using Digital Games

The TATG survey was used to measure TLs' attitudes about digital games on a Likert-type scale of 1 to 5, with mean scores closer to 1 representing negative attitudes and closer to 5 representing positive attitudes. Findings showed that while TLs tended to perceive digital games as beneficial learning tools (M = 3.69), first- and second-order barriers were evident. For the TLs, first-order barriers to digital game use were lack of support (M = 3.17), lack of time (M = 3.24), school policies (M = 3.17), and lack of budget (M = 3.24). Second-order barriers were lack of incentives (M = 3.18) and the drawbacks (M = 3.23) of digital games. Table 2 displays the mean scores for each barrier subscale.

In the support subscale, lack of support from technology personnel (M = 2.97) and lack of support from administrators (M = 2.95) were viewed as the greatest barriers. Parental support (M = 3.12) of games was perceived as less of a barrier. The only statement in the support subscale that did not present as a barrier by the majority was "if technology broke down, I could not get help" (M = 3.58). In the sample, 63.3 percent (n = 74) disagreed or strongly disagreed with that statement. Because many TLs act in the capacity of technology coordinators at their schools, those results

might be an indicator of their confidence in their own troubleshooting skills.

In the time subscale, lack of time to implement games (M = 2.84) was seen as the greatest barrier by TLs. In the sample, 39.2 percent (n = 46) disagreed or strongly disagreed with the statement "there is enough time to implement games in a typical day." Another 32.5 percent (n = 38) took a neutral position on that statement, possibly reflecting uncertainty due to lack of experience with game implementation. The only statement in the time subscale that TLs did not perceive as a barrier was "games take too long to learn" (M = 3.73). In the sample, 66.6 percent (n = 78) disagreed or strongly disagreed with that statement, possibly reflecting their level of comfort with using technology, a consistent finding within the survey results.

In the policies subscale, the only statement that the TLs strongly disagreed with was "I don't know what the school policy is on use of games" (M = 4.16). In the sample, 81.2 percent of participants (n = 95) disagreed or strongly disagreed with that statement, suggesting that they were well versed in school policies regarding game use. Negative perceptions toward the other statements indicate TLs' tendencies to perceive blocking controls (M = 2.72) and safety policies (M = 2.48) as barriers to the use of games in schools.

In the budget subscale, responses were fairly spread out among the statements, suggesting some disagreement and perhaps reflecting TLs' own budgetary experiences. The only statement within this subscale that most of the TLs strongly disagreed with was that "games are too expensive to use" (M = 3.63). In the sample, 64.1 percent of participants (n = 75) disagreed or strongly disagreed with this statement. Results suggest that while school budget is possibly a barrier for purchasing digital games, TLs did not necessarily view digital games themselves as being too expensive.

In the incentives subscale, 57.2 percent of participants (n = 67) disagreed or strongly disagreed with the statement "using games would not be worth it" (M = 3.56) TLs were consistent in their agreement that there are no incentives or rewards in place for using digital games in schools. Interestingly, responses to the statement "if my school rewarded the use of games, I might consider it" (M = 2.93) were largely neutral (47.9%, n = 56), suggesting that the use of incentives might not necessarily increase digital game use among TLs.

In the drawbacks subscale, 80.4 percent of participants (n = 94) disagreed or strongly disagreed with the statement "there is no educational content in games" (M = 4.01). However, results from other statements in the subscale suggest concerns about digital game use, most notably in the areas of alignment to tests (M = 2.62) and inappropriate content in games (M = 2.62). These results may reflect TLs' perceptions about school policies (e.g., curriculum policies, filtering policies) as a barrier to digital game use.

Findings support the overarching hypothesis that TLs and teachers share similar perceptions about first-order barriers, including lack of time, lack of support, and lack of infrastructure (Ertzberger, 2009; Gros, 2007; Ketelhut & Schifter, 2011). They also share similar perceptions about second-order barriers; both groups perceive lack of alignment to tests or curriculum as drawbacks to using digital games (Barbour, Evans, & Toker, 2009). This suggests that TLs, like teachers, may recognize curricular connections to games but are not sure how to implement them successfully within the confines of curriculum standards.

DISCUSSION AND CONCLUSION

This study showed that TLs do recognize the learning benefits of digital games, and some are using them for game-based lessons. While a number of the lessons used games for practicing isolated skills (e.g., Order in the Library), there were also examples of TLs using more complex games (e.g., Minecraft) that promoted 21CL, especially in classroom-integrated instruction. Classroom-integrated instruction is more likely to occur in schools with well-supported, flexible scheduling environments, and lack of time may be less of a barrier in those environments if it allows TLs more time to plan and collaborate with teachers on game-based lessons.

Training on digital game integration may also improve TLs' abilities to recognize and implement digital games that support 21CL. This would benefit students in the library through access to digital game collections, technology for game play, and gaming initiatives. As a result, the library could serve as a "third space" for connecting students' informal and school-based literacy practices (Emborg, 2011).

TLs who are knowledgeable about digital game integration may be better able to collaborate with teachers on the kinds of game-based lessons that promote multiple literacies. They may be more likely to recommend digital games that support 21CL, and when TLs serve on decision-making committees that impact areas such as technology planning and curriculum development, knowledge of digital game integration may make them better advocates for digital games on the schoolwide level.

REFERENCES

Adams, S. (2009). The case for video games in libraries. *Library Review, 58*(3), 196–202.

American Association of School Librarians (AASL). (2007). *Standards for the 21st century learner.* Retrieved from http://www.ala.org/aasl/sites/ala.org.aasl/files/content/guidelinesandstandards/learningstandards/AASL_Learning_Standards_2007.pdf

Baek, Y. K. (2008). What hinders teachers in using computer and video games in the classroom? Exploring factors inhibiting the uptake of computer and video games. *CyberPsychology & Behavior, 11*(6), 665–671.

Barbour, M., Evans, M., & Toker, S. (2009). Making sense of video games: Pre-service teachers struggle with this new medium. In I. Gibson et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2009* (pp. 1367–1372). Chesapeake, VA: AACE.

Bingimlas, K. (2009). Barriers to the successful integration of ICT in teaching and

learning environments: A review of the literature. *Eurasia Journal of Mathematics, Science, and Technology Education, 5*(3), 235–245.

Brickner, D. (1995). *The effects of first and second order barriers to change on the degree and nature of computer usage of secondary mathematics teachers: A case study*. Unpublished doctoral dissertation, Purdue University, West Lafayette, IN.

Emborg, J. (2011). Libraries as the spaces between us: Recognizing and valuing the third space. *Reference & User Services Quarterly, 50*(4), 338–350.

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47–61.

Ertzberger, J. (2009). An exploration of factors affecting teachers' use of video games as instructional tools. In I. Gibson et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2009* (pp. 18251831). Chesapeake, VA: AACE.

Farmer, L. S., & Murphy, N. G. (2010). eGaming and girls: Optimizing use in school libraries. In R. Van Eck (Ed.), *Interdisciplinary models and tools for serious games* (pp. 306–332). Hershey, PA: Information Science Reference.

Fullan, M., & Stiegelbauer, S. M. (1991). *The new meaning of educational change*. New York: Teachers College Press.

Gee, J. P. (2007). *What video games have to teach us about learning and literacy* (rev. ed.). New York: Palgrave Macmillan.

Gee, J. P. (2012). Digital games and libraries. *Knowledge Quest, 41*(1), 61–64.

Gros, B. (2007). Digital games in education: The design of game-based learning. *Journal of Research on Technology in Education, 40*(1), 23–38.

Hung, W., & Van Eck, R. (2010). Aligning problem solving and gameplay: A model for future research and design. *Interdisciplinary models and tools for serious games: Emerging concepts and future directions* (pp. 227–263). Hershey, PA: Information Science Reference.

Kahoot. (2014). Kahoot! [classroom response system]. Available at https://getkahoot.com/

Kennedy-Clark, S. (2011). Pre-service teachers' perspectives on using scenario-based virtual worlds in science education. *Computers & Education, 57*, 2224–2235.

Kenny, R. F., & McDaniel, R. (2011). The role teachers' expectations and value assessments of video games play in their adopting and integrating them into their classrooms. *British Journal of Educational Technology, 42*(2), 197–213.

Ketelhut, D. J., & Schifter, C. C. (2011). Teachers and game-based learning: Improving understanding of how to increase efficacy of adoption. *Computers & Education, 56*(2), 539–546.

Maddux, C., & Johnson, L. (2010). Information technology in higher education: Tensions and barriers. *Computers in the Schools, 27*(2), 71–75.

Mojang. (2009). Minecraft [computer game]. Available at https://minecraft.net/

Mrs. Lodge's Library. (2013). Shelver [computer game]. Available at http://www.mrslodges-library.com/play-shelver/

Nicholson, S. (2010). *Everyone plays at the library: Creating gaming experiences for all ages*. Medford, NJ: Information Today.

Partnership for 21st Century Skills (2009). *P21 framework definitions*. Retrieved from http://www.p21.org/documents/P21_Framework_Definitions.pdf

S2S Utopia. (2004). Order in the library [computer game]. Available at https://www.ischool.utexas.edu/order_in_the_library

Shute, V. J., Rieber, L., & Van Eck, R. (2011). Games . . . and . . . learning. In R. Reiser & J. Dempsey (Eds.), *Trends and issues in instructional design and technology* (3rd ed., pp. 321–332). Upper Saddle River, NJ: Pearson Education.

Squire, K., & Steinkuehler, C. (2005). Meet the gamers. *Library Journal, 130*(7), 38–41.

Starfall Education. (2002–2014). Starfall: Where children have fun learning to read [computer game]. Available at http://www.starfall.com/

TeacherGaming. (2011). MinecraftEdu [computer game]. Available at http://minecraftedu.com/

Van Eck, R. (2013). *NSF final evaluation report for PlatinuMath*. Washington: NSF.

Amanda Hovious is a librarian with a background in public and academic libraries. She has recently completed a second master's degree in instructional design and technology, and this article presents the results of her thesis research. She has conducted webinars on technology topics that are relevant to librarians and currently has a book in the works that will serve as a guide to transmedia storytelling for the profession. She blogs at designerlibrarian.wordpress.com

Richard Van Eck is a professor of instructional design and technology at the University of North Dakota. He is a frequent keynote speaker and author on games and education including talks at TEDx talk and South by Southwest. He has been a designer and evaluator of several serious games, including Math Builders (a game to promote transfer of mathematics), Adventures in Problem Solving (Texas interactive Media Award, 1999), Ribbit's Big Splash (Gulf Guardian Award 2002), and Project NEO (an NSF-funded science game for preservice teachers). He has also published and presented on intelligent tutoring systems, pedagogical agents, authoring tools, and gender and technology