Video Games as Digital Learning Resources: Implications for Teacher-Librarians and For Researchers

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For many teens of both genders in industrialized countries, video gaming is an integral part of their play and of their informal learning. This qualitative study explored the learning experiences of adolescents as they played recreational video games of their choice in their homes, with the intent of understanding how they came to believe in their ability to learn in informal learning situations. These teens perceived their learning as evolutionary, constructive, embedded in context, and most satisfying when self-solved. This report concludes with implications for teacher-librarians and implications for further research on bridging the gap between formal and informal learning.

Introduction

To thrive in today's world of rapid change, individuals need to believe they have the ability to learn in a variety of settings or circumstances (Bandura, 1997; Ellyard, 2002). Children develop this cognitive self-efficacy not only in school settings, but also in informal or out-of-school learning situations (Bandura, 1997) such as digital (computer and video) gaming. If, as researchers such as Sherry Turkle (2004) claim, technology changes the way we think, then digital games, one of the most pervasive of technologies in today's wired and connected homes, have an impact on our children's cognitive processes. Our children bring their informal learning experiences with them to the classroom, yet we know little about how those experiences shape the way they think and learn. Indeed, there is little research at the basic education level (Kindergarten to Grade 12) on bridging the gap between school or formal learning and informal or out-of-school learning (Sefton-Green, 2004). This is an unacceptable vacuum, especially when one considers the amount of leisure time spent by many children on digital games that can be effective informal learning tools (Gee, 2003). In addition, research on the implications of digital games for education has been conducted primarily with adults and computer-based games.

Overall, limited research examines the implications of console-based or handheld-based video gameplay for children (Anderson, 2004; Blumberg & Sokol, 2004; Carr, 2007; Inkpen et al, 1994; Sanford & Blair, 2008; Walton, 2002). The problem, then, is that the significances of recreational video gaming for formal learning are largely ignored by educators. In this paper I discuss the learning experienced by eight adolescent videogamers during gameplay (the gamer's interactions with the actions, objects, and meanings of a game). I begin with a brief overview of the research literature and then present the design of the study, the findings, and the implications of these learning experiences for teacher-librarians and researchers.

Literature Review

Good digital games are effective instructional resources that foster engaged learning (DeMaria, 2007; Galloway, 2006; Gee, 2007, 2003; Newman, 2004; Shaffer, 2006), and adolescents of both genders are avid gamers (Newman, 2004). Children in most industrialized countries have abundant access to digital games (Chou & Tsai, 2007; Facer, 2001; Gavin & Noguchi, 2006; Lenhart et al., 2008; Nielsen Games, 2008). Little wonder that Maria von Salisch, Caroline Oppl, and Astrid Kristen (2006) claim that in technology-oriented countries, "playing computer and video games has become one of the favorite leisure-time activities for boys and (less so) for girls" (p. 147).

Digital games, regardless of platform, are not easy to play; they are complex and demanding learning activities (Clarke & Duimering, 2006; Stapleton, 2004). In recent years, studies connecting digital gaming and learning have become more numerous. The majority of studies have focused on adults and computer games but an increasing number are now examining children and digital games, primarily computer games (Agosto, 2004; Carr, Buckingham, Burn, & Schott, 2006; de Castell & Jenson, 2003; diSessa, 2000; Kafai & Resnick, 1996; Squire, 2004; Sutherland et al, 2004). Researchers who investigate children and videogames tend to study psychological effects (Greenfield, 1984; Loftus & Loftus, 1983), cognitive processes (Blumberg & Sokol, 2004), gender issues (Carr, 2007; Cassell & Jenkins, 1998; Inkpen et al, 1994), or literacies (Carrington, 2007; Sanford & Blair, 2008; Sanford & Madill, 2007). Few studies of recreational digital gameplay relate to the transference of learning strategies and inquiry learning. In one informal learning study, Pillay (2002) identified the cognitive processes used by adolescents ages 14–16 years during two types of recreational computer gameplay. She found that recreational computer gameplay "facilitates different types of schemas" (p. 348) for learning that might be used in other technological learning environments such as school libraries.

Consalvo (2005) compared the use of out-of-game resources in single and multi-player recreational computer and video games. She noted that accessing out-of-game resources is common practice in recreational digital games and proposed that the use of external resources needs to be a component of educational computer games. She suggested that the use of outside resources can be accommodated in multi-player educational games by developing cooperative, rather than competitive games; by incorporating gamer-developed game-related resources; and by providing all players access to outside resources. Strategies in which learners are involved in cooperative learning activities, in building their own understandings, and in using a variety of

resources are consistent with those used during the effective group inquiry projects that often occur in school library programs (Alberta Learning, 2004).

In sum, few studies have considered video games played on consoles or handhelds despite their "stability, ease of use and broadband access" (Kirriemuir, 2002, p. 13) and fewer still have considered their implications for children, inquiry, and school library programs.

Design of the Study

In keeping with basic or generic qualitative research methodology (Merriam, 1998), I used observations, open-ended conversations, reflective notes, a questionnaire, and audio- and video-recordings of three female and five male adolescent gamers, ages 12–18, before, during, and after playing a recreational video game of their choice in their homes. Strategies used for generating rich discussions included conversation starters, Talk/Think Alouds (Ericsson & Simon, 1993), sideshadowing (McClay, 2002; Welch, 1998), and Think Afters (Branch, 2006). Textual analysis, using narrative (Polkinghorne, 1995) and discourse analysis procedures, was used to interpret the data.

Ericsson and Simon (1993) identified two types of concurrent verbalizations, Talk Alouds, explanations or descriptions of what the participant is doing, and Think Alouds, recountings of the participant's thoughts. They found that participants who are asked to talk aloud sometimes lapsed into Think Alouds while immersed in learning. Therefore, because my purpose was to reach an understanding of adolescent gaming experiences, I purposefully asked the participants to tell me what they were doing as they played the game so that both their explanations (Talk Alouds) and their thought processes (Think Alouds) were generated during our discussions. To foster gamers' reflections on a completed task, I asked them to use retrospective verbalizations to recount what was happening as they watched a short replay of one of their gaming tasks. These Think Afters (Branch, 2006) produced further descriptions of their progress and their thoughts as they studied their just-completed gameplay. All three verbalizations were prompted by open-ended questions and by sideshadowing.

Sideshadowing is a technique originally proposed for encouraging writers to consider multiple possibilities in their creations (McClay, 2002; Welch, 1998), but can also be appropriated for conversations and observations. Sideshadowing reminds the researcher to look for what the subject does *not* say and to look for the choices that were *not* made. It is one strategy that elicits information about "the gap between what people say they do and what they actually do" (Boellstorff, 2006, p. 32). Whenever I noticed irregularities between participants' actions and verbal descriptions I used sideshadowing to draw out explanations for these discrepancies. Using this tool means the researcher must "enter into, and situate her responses within multiple readings that have already begun" (Welch, 1998, p. 388). In other words, as inquirer, I stepped into a gaming situation that the teens had ***read*** or played many times before. I tried to position myself in this landscape in order to develop questions about the choices and responses the teens did *not* make. Their responses led to a fuller and more complete understanding of how they experienced learning.

In order to study the everyday gaming and learning "experience from the point of view of the subject" (Schwandt, 2001, p. 192), I used unstructured conversations (Carson, 1986) rather than interviews to deepen both the participant's understanding and my understanding of the

phenomenon being studied, that is, video game-play. Carson (1986) notes that interviews are "designed to elicit information from informants concerning a topic which is of relevance to the researcher" (p. 74), whereas conversational research leads to a more collaborative understanding of the topic being scrutinized. Open-ended prompts encouraged conversations about the interactions between the gamer and game, about the learning experiences during gameplay, and about the interrelationship of components that lead to good gaming.

In all, it took about six months to complete the observations of teens who played a single player self-selected video game on a platform of their choice. Volunteer participants shared their gameplay over two conversations of about an hour each. As an observer, I discussed the gameplay and the experience with the gamer as we sat side-by-side facing the screen, but I did not engage in playing the game myself. Since I have a working acquaintance with a number of digital games and genres and some conversational practice, I anticipated becoming quickly attuned to the video gameplay. In spite of prior experience, this method of observation proved to be more difficult that anticipated and required intense concentration to keep up with and to interpret the participants' commentaries. This difficulty in interpreting gaming interactions, though, is apparently disorienting even for expert gamers. For instance, Clive Thompson, a technology and culture writer who is also an experienced gamer, admits that as observer, he does not see the same things on the screen as do the gamers he is watching (CBC-TV, 2007). Regardless, conversation-in-action or Talk Alouds generated copious data that I re-played and re-examined during data analysis. Reflective notes were recorded immediately after each session and from the video footage.

After collecting the data, I first created a narrative or thick description of each gamer, the game space, and the gameplay. I used narrative analysis as the process for analyzing the field texts and created a diachronic narrative, a "sequential relationship of events" (Polkinghorne, 1995, p. 12) of each gamer. Narrative analysis is a hermeneutic process that endeavors to build a cohesive understanding in the form of a narrative of "how and why a particular outcome came about" (Polkinghorne, 1995, p. 19). I then used this same iterative process to search the narratives and field texts for themes and concepts. Data were considered systematically by coding in the margins, selecting themes, examining the flaws and cracks in the descriptions that formed from the field texts, and searching for insights and new questions during the analysis. I looked for how the teens made sense of their gaming, for recurrent stories or themes, for variations of coherence and organization, for how the teens talked about learning the game, for the funds of knowledge they brought with them to the game, for whether they saw generalizations, for incidents of reflection, for their processes of thought, and for the supports that helped their learning. Keeping in mind the lived interview, I considered the contextual and cultural implications, and searched for additional information that would merge with the ongoing interpretations. In this recursive process of further analysis, of re-examining both the data and my understandings (Ellis, 1998), I tried to uncover what I did not see before with the intent of creating the most generative, "coherent, comprehensive, and comprehensible" (Ellis, 1998, p. 27) interpretation possible. Overall, the goal of this research was not "the interpretation of play, but the play of interpretation" (Galloway, 2006, p. 28), a maxim borrowed from Jacques Derrida and one I did my utmost to follow.

Findings

The study participants, teens from middle class homes, viewed videogaming as only one of their many out-of-school leisure activities. Only two participants considered themselves to be *real* or highly skilled gamers, but all viewed their gameplay as a release or relaxation before starting or after completing homework, before bedtime, between scheduled activities, or during holidays. Not all the participants were top academic students, but all thought they were good readers and that their school work was important. Every game they chose for this study was from series games that were familiar to the teens. And they all played more than one single player and multi-player game on more than one platform. Table 1 provides a snapshot of the gamers (pseudonyms) and their digital gaming profiles.

The study data suggest that adolescent gamers have specific game and genre preferences, that they believe they can "figure things out" and "beat any game eventually" at their own pace and by themselves, and that they use diverse metacognitive and cognitive processes during the learning process.

Video Game Preferences

These teens placed a great deal of emphasis on evaluating and choosing the *best* video game and platform for their limited amount of free recreational time. They clearly described why they chose a particular game and console. For instance, Alexia, a 16 year old, commented, "I like role-playing games where you have to run around and figure things out. I don't like the Sims now. It was kind of like an electronic version of Barbie or almost, I guess, [playing] dolls." Individual choice was of prime importance to their gameplay enjoyment. While all played digital games on computers, consoles, and handhelds, they preferred console or handheld games to computer-based games because the controls were easier to learn than combinations on a computer keyboard. This routinization of gameplay actions allowed the teens to concentrate on the meaning of their gameplay rather than on the mechanics of coordination.

Perceptions of Learning

The videogamers viewed learning as developmental and self-directed. The gamers in my study all thought they had the ability to learn and that capability is developmental, not innate. That is, they felt they would ultimately succeed in their gameplay through their own efforts. They believed that learning to play a video game requires personal agency, perseverance, and practice. As Danny, the 18 year old, said, "You never start out as the master of anything. You have to practice that skill and use it constantly to increase and improve." They monitored their improvement or learning in order to determine when they "needed to get stronger, and … the best way to do it" (Pierre, age 14). As well, the teens stated they gained the most satisfaction from accomplishing goals on their own. They felt proud and capable to have figured out things by themselves.

Frustration was not a response observed in this study, but uncertainty about what strategies to use was definitely part of the gameplay experience and especially noticeable when the participants did not know how to solve a task. Although frustration is often experienced in solving a information-related task, Kuhlthau (2004), in her studies of the information search

Table 1
Gamer Profiles in Alphabetical Order

Gamer	Platform/ Game	Play/ Week	Game Space	Genre Experience	Platform Experience
Alexia 16 years	Wii *Zelda: The Twilight Princess* (RPG)	2 – 3x	Family room	RPGs First Person Shooters Fantasy Simulations Action/ Adventure Multi-player	Computer Nintendo 64 Game Boy GameCube
Amos 12 years	PS3 *Need for Speed* (Racing)	2 – 3x	Family room	RPGs Sports Racing	Computer PS2, 3 Xbox
Chris 14 years	Xbox 360 *NBA07* (Sports)	3 – 5x	Bedroom	Sports Multi-player	Computer PlayStation
Danny 18 years	Xbox 360 *Oblivion* (RPG)	Daily	Living room	RPG Sports Strategy MMOGs First Person Shooters	Computer Handhelds Nintendo 64 Super Nintendo Xbox
Jim 14 years	Wii *Super Paper Mario* (RPG)	3 – 5x	Family room	RPGs Puzzle Platform MMOGs	Computer Nintendo 64 Game Boy GameCube
Kaitlyn 14 years	Wii *WarioWare Smooth Moves* (Action) GameCube *Animal Crossing* (Simulation)	2 – 3x	Office Family room	Action/ Adventure Sports Simulations Multi-player	Computer Game Boy (s) Nintendo DS
Marieta 16 years	Nintendo DS *Pokemon Diamond* (RPG)	2 – 3x	Office	RPGs Action/ Adventure Fantasy	Computer Game Boy
Pierre 13 years	PS2 *Final Fantasy 12* (RPG)	Daily	Bedroom	RPGs First Person Shooters Action/ Adventure MMOGs	Computer Game Boy(s) GameCube Nintendo 64, Wii Super Nintendo Xbox 360 PS 1,2, 3

processes of college students, security analysts, and lawyers, Kuhlthau (2004) found that the lawyers were the only participants who did not experience feelings of "anxiety and frustration related to uncertainty" (p. 178) in the beginning stages of research; instead the lawyers "expressed heightened interest and enthusiasm for more complex tasks that required considerable construction and creativity" (p. 178). The gamers in this study did not express feelings of anxiety or frustration as a result of their uncertainty either, but appeared to find the challenges "interesting, imaginative, exciting, and fascinating" (p. 179), just as did the lawyers in Kuhlthau's study. Kuhlthau proposed that the lawyers responded positively to uncertainty because they "had learned from their past experience that uncertainty is to be expected in complex tasks where considerable construction is required" (p. 179), a suggestion that may also pertain to experienced video gamers such as the teens in this study.

The teens seemed to trust themselves, the context, and the mediational game tools to support their learning. They experienced tension, a feeling characteristic during the playing of most games, but not the frustration adults sometimes experience when a problem seems unsolvable (Kuhlthau, 2004). The apparent lack of frustration after repeated failures in a recreational activity supports Bilal's (2005) proposal that children and young adults may respond differently than adults to impediments to their learning. This finding suggests that as educators we must be cautious not to transfer our feelings of frustration when we cannot seem to scaffold a learner through a concept. Such an assumption may be an educator-fulfilling prophecy rather than an actuality for students.

Thinking Strategies

During the gameplay experience, the participants used toolkits of cognitive processes in combination with actions, emotions, and tools to mediate learning. Cognitive and metacognitive skills interacted in an ongoing, recursive manner as gamers struggled to make sense of the problems they faced. Jim, for example, worked through a complex patterning puzzle in *Super Paper Mario* and, throughout the 17 minutes it took him to figure out how to get different coloured squares on the screen to light up, used a multiplicity of cognitive and metacognitive processes. Table 2 offers a brief excerpt of his Talk/Think Alouds and thought processes as he worked through this challenge. His approach to solving the puzzle reflects his stance as an inquirer.

The findings showed, then, that the adolescent gamers believed learning was self-directed and required self-monitoring. The teens emphasized the importance of grounded choice both in game selection and interactions, and used metacognitive and cognitive processes in a recursive and interactive manner. They approached their gameplay as inquirers, and asked, *What is that? Why is it here? Can I use that? How do I use that? How might I use that to reach my goal? What would happen if…?*

Implications for Teacher-librarians

Video games, like school libraries, offer mixed reality spaces "that fuse the virtual and physical" (Nardi, 2008). Indeed, video gameplay embodies inquiry-based learning, because learners "are involved in their learning, formulate questions, investigate widely and then build new understandings, meanings and knowledge" (Alberta Learning, 2004, p. 1). Inquiry is a way of

Table 2
Excerpt From Jim's Talk/Think Alouds During Video Gameplay

Talk/Think Alouds	Thinking Strategies
So…now we have orange, dark blue, black *squares lit up*…black, dark blue…red *not lit up.* Hmmm. [long pause]	Synthesizing
So, is there one that changes *the* orange and green *squares* like the blue block *changes the purple square*?	Reflecting
I'm just checking to see which squares are affected each time.	Cause-effect
I'm going to hit this green one and see what happens to the other squares.	Trial and error
The orange and yellow ones lit up, the blue one and the black one didn't. So, I can get it so that green, yellow, orange *squares* are on. Blue and black *squares* are all off.	Processing (Inductive reasoning)
I know there's one thing here that I missed…	Synthesizing

life in the virtual world; it is a frame of mind required to approach and progress through the challenges of the game. The gamers in this study were immersed in a culture of inquiry as they sought to problem-solve their way through the complexities of a pretend world.

Students who are gamers, therefore, come to our school libraries with experiences in inquiry-based learning. However, we as educators are often unaware of teenage cultural exposures, and therefore limit our opportunities to relate to youth, to understand the informal learnings they have experienced, and to identify the learnings and literacies that can be transferred from informal to formal learning. Researchers such as Bandura (1997) have found that most adults and youth need supports or scaffolds to transfer learnings from one discipline or area to another.

The first step for teacher-librarians, in assisting students to transfer learnings from video gameplay to formal learning, is to sample the digital games that are now integral to our children's lives. By engaging in digital gameplay as observers, cheerleaders, or participants, teacher-librarians can more readily relate the out-of-school learning of gameplay to the formal learning of the school. Developing connections between these two is more critical now than ever before, because gaming, like formal learning activities in the school library programs of today, is an interactive, not a passive, learning experience. Educators need to capitalize on the literacy and learning skills the students bring to class.

The second step in fostering the transference of skills is to consider the aspects of videogames that generate inquiry in videogamers. According to the teens, the game characteristics that appeared to stimulate inquiry were significant interactions and intertextuality.

Significant Interactions

In games that allowed a variety of interactions with a virtual world, the teens were excited about these possibilities and took pride in demonstrating the goals they had reached. It is not desirable in a game, which is underpinned by rules and regulatories, to have all game features

offer limitless possibilities for action, because such a design would undermine the gameplay. However, the pleasure these adolescents expressed when they could perform multiple significant interactions with a game feature reflected a sense of agency that usually unleashed creativity in either planning strategies or in designing game elements. Providing opportunities to simply point and click preset responses was of no interest to the gamers; rather, they searched for ways to solve problems and to have a personal impact on the virtual world. This finding suggests that school library programs that encourage students to manipulate and interact in meaningful ways with a variety of learning tools such as databases, print sources, multimedia, and human resources may be an effective approach to promoting creativity.

The affordances or potentials for action allowed by objects in real-life are dependent on their properties and on one's experience, creativity, and critical thinking skills. A book, for example, can afford reading, throwing, holding a door open, or carrying a cup of coffee, depending on an individual's mindset. That is, what might be an affordance or possibility in an object for one person is not for someone else. In gaming, possible interactions with objects such as maps, monitoring devices, and artifacts are limited by the game designers and by the gamers' level of skill. Determining whether to use the affordances allowed by these features was left in the hands of the learner and dependent on their skill level. The implication for teacher-librarians, then, is to provide toolkits of leveled supports and scaffolds (such as just-in-time instruction) for inquiry that students can choose to use once they have the skills, rather than mandating the use of specific tools.

Intertextuality

Video games contextualize learning within an imaginary world. Each learning activity, even the introductory tutorial, is intrinsic to the virtual environment, not an isolated event, and is embedded in the narrative. The superlative graphics in video games are not for appreciation alone. Such features are often intertextual, providing similar information in more than one format. This intertextuality encourages multi-literacies and ecologies of thinking skills since learners can choose which text to interpret first before becoming fluent in comprehending different information texts such as print, icons, charts, tables, audio and video. School libraries also provide optimal opportunities for students to be exposed to information presented in a variety of formats. When teacher-librarians scaffold students in their interpretation of multi-modal resources, children have the opportunity to develop and refine their multi-literacy skills.

Adolescent gamers are multi-literate in the sense that they are able to make sense of a wide assortment of media formats, but there is much more to multi-literacy than knowing how to interpret different texts. Teens often lack the retrieval and evaluative skills that enable inquirers to evaluate information sources. Jenkins refers to this tendency of adolescents to swim "through a new media landscape" (Jenkins & Robison, 2007) without reflecting on the media they are experiencing as 'the transparency problem.' But because teens seem so able to navigate and find information online, teachers sometimes incorrectly assume their confidence in maneuvering online as an ability to evaluate and synthesize information. Teacher-librarians need to probe students about their interpretations of digital data in order to encourage the development of critical thinking and in-depth information literacy skills.

In the virtual worlds of video games, players are accustomed to accepting the provided texts without question since consequences are not real. Unfortunately, this naïve acceptance of information is commonly applied to other media. For instance, when teens use media to retrieve information for school studies, they rarely question its origin and validity. It may be that their ability to make sense of a variety of texts leads digital adolescents to think they know *how* to use media to find information, and therefore that what they find is credible. However, it is a fallacy to think students know how to access and assess reliable information, as is apparent through their reliance on a single search engine to find information on the Internet. On the whole, our children are superficially digitally literate, because they can access information and interpret digital texts but rarely question or compare the information they have retrieved.

In textbook-based schools, this characteristic of unquestioning reliance on one source is encouraged. In resource-rich classrooms and school libraries that foster a culture of inquiry, students learn that information can be presented from different viewpoints and must be scrutinized before use. But children do not gain these understandings automatically, teachers and teacher-librarians must continually draw the attention of learners to the perspectives presented in all media.

Juxtaposed against this tendency to readily accept online information as accurate was the gamers' initiative to seek additional resources for support when they could not attain a game goal. They understood that the game, like all learning resources, was not a complete learning package and that they had to go elsewhere for suggestions when they were stymied in their gameplay. Some headed to online forums and/or game sites for tips, others read game magazines, and others talked to peers who also played the game. All of them knew that when the going got tough, they had to reach out for more information. This attitude that one resource is not a panacea is much encouraged in western educational curricula and a perspective that gamers bring to class. These two seemingly contradictory perspectives, first, that most information is credible (the transparency problem) and second, that one resource is not a panacea, provide fertile ground for cultivating critical thinking skills.

Drawing attention to the similar skills used in selecting and evaluating either video games or information sources is often an eye-opener for students. Indeed, school-library based inquiry projects present ideal teachable moments for teacher-librarians to foster discussions about evaluating information, about using multiple resources, about interpreting multimedia text, and about transferring relevant learnings from one discipline to another. Such conversations may lead students to understand that what they learn in one venue may be useful in another venue. Indeed, transferring learnings from informal learning activities to formal learning activities is not innate or automatic for learners of any age. Teacher-librarians must directly address the issue of transference by making connections, modeling transference of learnings from one situation to another, emphasizing **how** practice ~~before~~ **improves** performance, and fostering class and group discussions about the similarities amongst different kinds of learnings.

In sum, to engage today's learners in inquiry-based learning, teacher-librarians and teachers first need an understanding of video gameworlds, either as players or as attentive observers, before beginning to understand the wealth of skills that students bring with them to inquiry projects. Secondly, school library projects need to include the use of multi-modal

resources and to present learners with meaningful interactions rather than training exercises on how to do something. As facilitators to learning, teacher-librarians must provide specific, just-in-time scaffolds that lead students to question and explore the information they compile. Ultimately, the focus in inquiry-based learning is on process more than on content and end products.

Implications for Future Research

A cross-disciplinary study opens up many possibilities for further study. Implications arise for research on commonalities between inquiry projects and video gameplay, on children as gamer-learners, and on bridging and connecting the silos of informal and formal learning.

Based on my observations, I am struck by the similarities between effective video games and effective research projects. Many of the strategies used in gameplay are similar to those that researchers use in the inquiry process. Kuhlthau (2004) has explored the design of effective research projects, and many of the elements that she has found to be characteristic of effective research projects apply to effective video games. Similarities shared by effective information searches and effective gameplay include: a focus on process; clear goals; contextualized problem-solving; uncertainty, which leads to "innovation, creativity, and learning" (p. 208); exploring and hypothesizing; and learner selection of the game or research topic. Further cross disciplinary research to explore and examine the similarities between inquiry-based learning and video gameplay would provide insights into fostering successful inquiries in our school library programs.

This study is one of the few to explore how children perceive gaming. Most research in the area of gaming uses adults or college students as participants, and findings of those studies may not apply to children and youth in the basic education system. Moreover, most studies on video gameplay use Likert scales to gauge insight into players' perspectives on gameplay. A better understanding of gameplay from the learners' viewpoint, rather than assumptions made on the basis of structured interview questions and observations, is needed data in a research area dominated by standardized questions and decontextualized statistics. Open-ended studies that examine the childrens' perspectives on effective video games and the components of those games that impact their learning will provide valuable insights on improving educational opportunities in our schools.

Individual choice was of prime importance for these gamers. After careful consideration, these players determined the game they wished to play in their leisure time. Within their self-selected games, they then interpreted multimodal texts. Yet in inquiry projects, these same learners can show an apparent lack of multi-literacy skills in retrieving and processing information. Research that explores how children determine quality sources of gaming information and interpret multi-media texts in games compared to how they determine quality sources of other information and interpret these texts would build a better understanding of how teacher-librarians can teach transferability of evaluating and processing skills and strategies.

Conclusion

Video games are here to stay, in one form or another. As educators, it is essential that teacher-librarians actively observe gamers or learn to play a game or two themselves, because only by exploring the intricacies of the players' actions can one come to understand the way learning is experienced through gameplay. As researchers, we need to attend to how children experience video gameplay so that we develop a deeper, richer understanding of the cognitive processes and learning strategies that also apply to inquiry-based learning.

The results of this study suggest that learners maximize their understanding during challenging, self-regulated, situated learning activities. Teacher-librarians can capitalize on the skills and strategies of inquiry that learners bring to school by applying pedagogical strategies that aid in the transference of learning skills, in particular information literacy skills, between out-of-school learnings and in-school learning experiences. For example, most students need to be assisted in drawing connections between the strategies used to select and evaluate a learning resource such as a video game and those used to select a topic and resources for an inquiry project. Learners need opportunities to learn how to select a topic on their own without teacher-directed choices. Moreover, to embed an attitude of inquiry towards learning, learners need to experience inquiry on an ongoing basis in all curricula**.** Inquiry, after all, is not isolated from the and not a just a product to be evaluated, but rather inquiry is a way of interacting with one's surroundings and one's world.

As with effective video games, effective school library programs encourage the critical and creative thinking skills essential to inquiry rather than emphasizing only 'how to' training such as how to research, how to do a bibliography, or how to find and assess information. By providing toolkits of resources and just-in-time scaffolds on the use of resources, teacher-librarians contribute to the development of students who know how to select, evaluate, use, discard, and modify resources and who will develop the skills and strategies needed to persevere in the challenges they will face in the 21st century.

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