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Video gaming and interconnected meanings: Nuanced learning beyond the screen

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Abstract: This article draws upon data from two separate qualitative studies of video gaming as a means to highlight the ways that diverse literacies work in concert to mediate adolescents' learning on and off the screen. The research suggests that the confluence of multimodal literacies that impact gaming can also affect more traditional practices. The nuances of video game and gamified learning provide insight into the innovative and dynamic elements that inform students' out-of-school learning and potential in-school applications.

Keywords: video games, gamified learning, diverse literacies, innovative practices

1 Introduction

Digital learning and twenty-first century literacies are important topics of contemporary conversations about teaching and learning (Alvermann, 2010; Gee, 2007a, 2007b; Gutierrez, 2006; Kajder, 2010). The growing sentiment in the US and abroad—from pedagogy to policy—has been that digital literacies are present and future practices that need to be embraced and integrated into classroom learning and curricula (Alliance for Excellent Education, 2012; DCMS & BIS, 2009; ICTC, 2011; IRA, 2009; Knobel & Lankshear, 2010; NCTE Position Statement, 2008; PISA Assessment Framework, 2009). This recognition of digital literacies is essential to their supported inclusion within the classroom, but such inclusion does not automatically innovate practice (Abrams & Merchant, in press). A closer examination of ways that students learn from the confluence of digital resources will begin to provide insight into how students almost seamlessly draw upon a variety of media and affinity-based learning (Gee & Hayes, 2011) to help them achieve a particular goal. More specifically, this article focuses on how the interconnection of practices nurtures experimentation and engagement that honor students' video game learning; such a focus supports a nuanced exploration of student learning outside the classroom and provides insight into the dynamic use of digital practices inside the classroom.

Subsumed under the digital literacies umbrella, video gaming is a motivating, knowledge-building tool that has captivating features and fosters active learning (Abrams, 2009, 2012; Gee, 2007a, 2007b, 2011; O'Brien & Scharber, 2008; Salen & Zimmerman, 2004; Squire, 2008, 2012; Steinkuehler, 2011). Though recent reports indicate a decrease in retail game sales (Suellentrop & Totilo, 2012), the multi-billion dollar gaming industry, with spending expected to reach \$112 billion by 2015 (Bilton, 2011), remains a viable business built on sustaining user interest. A reported "97 percent of youth play computer and video games" (McGonigal, 2011, p. 11), and it behooves us as educators and researchers to consider not only what knowledge students develop within a game, but also what knowledge informs game play. Insight into the latter will illuminate ways that students draw upon and connect their diverse literacy practices to discover new understandings.

This article highlights data from several video game related studies conducted between 2009 and 2012, which provide insight into adolescent gaming and learning and the ways that diverse literacies work in concert to inform students' game play. In digital worlds, "knowledge is socially constructed and mediated

by the learners rather than simply absorbed unchanged from the expert” (Carrington & Robinson, 2010, p. 5), and, therefore, it is important to investigate students’ developing skills and knowledge sets that can enrich performances inside and outside the classroom.

Gamification

Though gaming-as-learning is an established principle, gamified learning has become the hallmark of edutainment and business training. Gamification—or “the process of using game thinking and game mechanics to engage audiences and solve problems” — is a buzz word infiltrating industries beyond the video game sector (Graham, 2012). Even iCivics.com, a non-profit organization supported by retired US Supreme Court Justice Sandra Day O’Connor, has released an online game, *Counties Work*, as a way to increase and spur citizens’ civic knowledge and involvement (iCivics.com, nd; Sasso, 2012). Gamified learning is inherently about “engagement, story, autonomy, and meaning” (Kapp, 2012, p. xxi), and these features appear to support the integration of context-specific information to achieve an overall goal.

In addition gamification has been linked to video games and their inspirational elements; however, there is a distinction between video games and gamification (Kapp, 2012). More specifically, Kapp identifies the two by domain and directionality: Video games occur in a pre-designed game space whereas gamification “tends to take the use of a game outside of a defined space and apply the concept” to other non-virtual domains (p. 15). Video games (and serious games) can have a problem solving and/or training purpose, but they are relegated to the console/platform and virtual environment (e.g., *World of Warcraft* players only playing the game and collaborating with their clans to kill beasts within the *WOW* design space). However, gamification involves the *application* of game or game elements to settings not preset by game designers; this includes the extension into non-virtual settings. Though award badges and ‘leveling up’ have been associated with gamification, Kapp (2012) suggests that, instead, the focus should be on learning potential: “the real power of game-based thinking is in the other elements of games: engagement, storytelling, visualization of characters, and problem solving. Those are the foundations upon which gamification needs to be built” (p. 12). Though the current educational system of points, tests, and grades doesn’t automatically gamify education, the motivation and engagement of games can be applied to academics (Smith-Robbins, 2011). Based on these insights, gamification and the application of information come to the fore when we consider digital literacies *in relation* to video game learning and classroom applications. More specifically, if we can better understand ways students are making cross-literate connections outside school, then we can help them achieve similar links among their diverse practices *and* academics inside school.

Building a Knowledge Network

In order to explore how knowledge of one practice informs the other, it is essential to consider students’ “funds of knowledge” (Gonzalez, Moll, & Amanti, 2005; Moll, Amanti, Neff, & Gonzalez, 1992), or “historically accumulated and culturally developed bodies of knowledge and skills” (Moll et al., 1992, p. 133). Particularly important to this discussion of gaming and learning is how students integrate their digital experiences across academic and recreational contexts, and the extent to which contemporary education and curricular requirements afford or limit the space for students’ funds of knowledge to emerge within the classroom.

Given that video games typically endorse experimentation and collaboration (Abrams, 2010; Gee, 2007a, 2007b; Steinkuehler, 2007) and gamification includes working with others in cooperative and/or competitive situations (Smith-Robbins, 2011), then many gamers may be accustomed to learning-by-doing and working with others. Gamers’ funds of knowledge, therefore may include interacting with others and sharing knowledge (Abrams, 2010; Abrams, Gerber & Burgess, 2012; Gee, 2007a, 2007b), and these practices are supported in online game forums, competitions, and informal conversations. Interestingly, such cooperative learning is also an essential component to K-12 classrooms, where dyads, triads, or larger group work has become a mainstay of contemporary curricula; US Common Core State Standards (2010) mandate peer collaboration: “Students must learn to work together, express and listen carefully to ideas, integrate information from oral, visual, quantitative, and media sources, evaluate what they hear, use media and visual displays strategically to help achieve communicative purposes, and adapt speech to context and

task” (p. 8). Therefore, working with others to solve a problem or complete a task may, in fact, be a learning approach that students are accustomed to both inside and outside school. Though this may be one way to loosely connect out-of-school literacies, such as video gaming, with academic practices, there are other ways in which we see students using their funds of knowledge to inform their practice in and out of school and in and out of gaming. The application of knowledge and techniques across place-based and virtual settings reveals ways students establish connections between their video gaming and other literate activities.

Further, when considering how students develop and apply their funds of knowledge, one needs to account for “passionate affinity-based learning” (Gee & Hayes, 2011), which “occurs when people organize themselves in the real world and/or via the Internet (or a virtual world) to learn something connected to a shared endeavor, interest, or passion” (p. 69). The knowledge and skills developed in passionate affinity spaces—which include the game space—involve learning in conjunction with others and the mediation of space-specific information, often reaching new understandings through the collaboration (Gee & Hayes, 2011). Both the discussion of game play and the collaboration within game play are key components to belonging to that particular affinity space and video game community (Abrams, 2010; Gee, 2007a, 2007b; Selfe, Mareck, & Gardiner, 2007). The funds of knowledge students access and/or hone in these affinity spaces (Gee, 2004) can mediate students’ situated practices, enable students to reach new discoveries and meanings (Davies, 2006), and inform students’ understandings in other spaces as well.

Confluence of Nuanced Knowledge and Choices: How Students Can Apply their Understandings

Examining how students apply their established understandings and skills across their literacy practices provides insight into the innovative learning and decision making students appear to do on their own volition. Qualitative data from two separate studies of gaming and learning provide data that speak to such knowledge application within and across affinity spaces. The following stories of J.D., Lyle, Garrett, and James (all names are pseudonyms) illuminate how their multimodal literacy experiences mediated their overall learning both on and off the screen.

Literacies Informing Game Play

In 2009, within the course of an eight-month study (that began in 2008), I shadowed and interviewed J.D. to learn about his literate activities in and out of school. In addition to discovering J.D.’s collaboration with friends to learn and play video games (Abrams, 2010), I also found that J.D. relied upon his knowledge of paintball to help him participate and succeed in playing first-person shooter game, *Call of Duty*. Although J.D. had not played *Call of Duty* in the past, he was an avid paintball player who had competed in tournaments and even filmed and reviewed his paintball games. J.D. drew upon his paintball strategies from one affinity space (paintball competitions) to help him navigate through the virtual shooter game and participate with his friends in another affinity space (the video game). J.D. explained how his paintball and his video game playing were somewhat related: “There’s a map that we play in *Call of Duty* and it’s just set up, and every time I play it, I think of how I play paintball. And that’s how I play the game and vice-versa.”

Conceptually, paintball provided J.D. a framework for strategizing, collaborating and shooting targets. J.D. also gained a firm knowledge of the language, behavior, values and moves associated with paintball that he tried, unsuccessfully, to apply to his *Call of Duty* scenarios, using paintball terminology to strategize with his virtual teammates:

“In paintball, it’s just out of habit like you ‘lane’ to let somebody go. So someone was next to me [in *Call of Duty*], and I said, ‘Lane to the right,’ and they didn’t know what that meant. They thought it meant—They ran right, and I was like no you got to run over there. Or I mean you have to shoot over there. So I, like by accident, you know, I’d say things just because you’re shooting, they’re shooting at something else. And I wanted, I could have easily said, ‘Just cover me. There’s someone shooting at me over there so I can’t move.’ But once I said, ‘Lane in,’ because it means the same thing.”

Though J.D. may have recognized similar gamified principles across the place-based and virtual games, J.D. quickly learned that he could not use paintball terminology because none of his friends understood his directions; paintball and *Call of Duty* were part of different affinity spaces with different Discourses (Gee, 2008, 2011), or being-valuing-doing combinations. What's important, though, is that J.D. recognized similar characteristics across the games, and *he* was able to apply knowledge from one practice (paintball) to another (playing a video game); the application of his funds of knowledge helped *him* conceptualize the practice (in this case strategizing and aiming). However, the particular connection J.D. attempted to communicate was limited only to those who would have had the Discourse-specific information and language.

Literacies, choices, and game play

Just as J.D. envisioned the extension of knowledge from one domain to another, so, too, do we see the connections between students' areas of interests and their video game choices. Research indicates that students who gravitate toward a particular sport often will look to play virtual versions of that activity (Crawford, 2005; Malliet, 2006). This passion for a sport or activity, however, also seems to feed into one's understanding of a game and one's ability to draw upon place-based events to inform game play. For example, a 13-year-old participant in my 14-month ethnographic study on gaming in a library, noted how he would choose basketball teams to play on his Playstation according to who was playing that evening on live television. Lyle had noted that "I like to play what games are on right now...whatever sport is being played at that time," and his choice of virtual sport mirrored that of the season: "Like in the fall, I like to play [American] football games. Now I'm playing like basketball games and stuff. And like in the spring I play baseball games."

Because contemporary video games feature virtual players who perform according to their real counterpart's recorded statistics, Lyle was able to make virtual choices based on real-time events. For instance, Lyle explained that he "made a bracket tournament," which he downloaded from CBSsports.com, for college basketball, and he used his phone and computer to access the latest scores to keep the bracket current. He applied principles and literacies from one game/practice to another. At the time I interviewed Lyle, he told me that "for the tournament, I picked Kansas to win. So I was...updating the score on my phone to see who won." Based on the outcome, Lyle selected virtual team competitions that mirrored the next set of college teams lined up to play in reality. He drew upon his knowledge of a physical affinity space and applied it to a virtual one.

In addition to making decisions based on the tournament bracket and his knowledge of sports, Lyle, a self-proclaimed Yankees baseball fan, also made in-game choices based on real-time actions of his favorite players, knowing well that the video game would enable him to make such replications. Lyle explained that he would watch to "see how CC Sabathia catches and how Derek Jeter like, how he hits— so in this game it's like the same thing. And Derek Jeter's swing is the same." Lyle's funds of knowledge for baseball (also evidenced in his fandom), along with his knowledge of current baseball statistics and real-time team performance, informed his video game decisions and game play. Further, when Lyle decided to play games that didn't correspond with real-time events, he would rely on his knowledge of college or professional team and player statistics to help him choose which team to play: "Like if I want a team that's athletic, I know which teams to pick, like USC are really athletic but they're not a good shooting team. But Purdue which is a good shooting team, I want them...if I want to have a team that can shoot three pointers."

What's more, Lyle perceived the direct relationship between his television viewership and his video game playing. Lyle explained how the 2010 Olympics inspired him to take up a new virtual sport, hockey, back in winter, 2010:

"Well first of all I saw the Olympics, and like I never really liked hockey, but when I saw that I thought that it was really good so I was playing this Team USA and I kind of felt like I was playing with them so.... it's just who I was rooting for at the Olympics, and I mean when I started playing NHL teams, I

don't really like a particular team because I don't love hockey, but I just play with like different teams but when I play with countries, I play with Team USA...because like I'm American."

Though Lyle didn't "love hockey," he established a personal connection between Olympic hockey games and the virtual ones. He chose the USA team because he related to it: "because like I'm American." Lyle recognized similarities across activities from one affinity space (that of a sports spectator and fan) and another set of practices of an affinity space (that of a sports virtual gamer).

Like 13-year-old Lyle, 17-year-old Garret occasionally spoke of how he adopted moves he had seen on television to play *Call of Duty*. One time Garret had been "watching the History Channel...they have like World War II stuff, and during that game [*Call of Duty*], like I'll, oh yeah, I saw this on TV. You do this and that like if you go into a room, throw a grenade in it, I saw that on TV. Just did the same thing" in *Call of Duty*. In other words, Garret learned a "general idea about war and tactics" from the History Channel and applied that knowledge to his video game play. As a result, Garret understood the context for specific military action, and when he viewed the situation to be similar to what the History Channel featured, he implemented the established strategy into his video game play.

These exemplars reveal the fascinating nature of the students' network of literacies and their application of knowledge from one context to another; students built upon their funds of knowledge and their understandings of a topic, developed in an affinity space or acquired from a specific source (e.g., television), and they utilized this knowledge as they interacted with related topics in virtual environments. J.D. saw the loose connection between paintball and *Call of Duty*; Lyle chose virtual players based on real-time events and scores; and Garrett applied knowledge from *History Channel* segments to orchestrate his game play. Much of this is reminiscent of how another participant of mine, Robbie, used his knowledge of the Napoleonic wars to modify his *Rise of Nations* moves so that virtual Napoleon would not fail as he had in reality (Abrams, Geber, & Burgess, 2012). Such innovative learning stemmed from the students' ability to recognize and apply related information across practices and environments. In all, what we see is how students' literacies are fluid and that their video gaming, though a distinct practice, is, indeed informed by funds of knowledge and information gleaned from multimodal resources.

Literacy practices informing traditional reading

Just as the students applied outside knowledge to their games, so, too did such knowledge inform other activities, including those related to school. Sports enthusiast, Lyle, spoke to me about a book about American football he had just finished reading: "*Bleachers*...it's about football...about these guys that come back to their home town because their coach... he's dying so they come back for his like memorial service and stuff and they talk about old games. So it was a good book." Similar to Steinkuehler's (2011) participant whose "entire out-of-school literate life was wholly organized around [his] interests," (p. 62), Lyle's sports focus was threaded across his literacy practices from observing to gaming to reading sports-related fiction and/or non-fiction. In addition, Lyle looked for works by the author, Mike Lupica because "I knew who Mike Lupica is like even before I read any of his books because he's on a show called *The Sports Reporters* so yeah he's a journalist for I think like...a newspaper from this area. And I knew that he was a good writer. So I forgot where I, I think I saw in the library that he wrote books." Lyle's testimony suggests that not only had he watched Mike Lupica on television, but also he had read other material Lupica had written ("I knew that he was a good writer"). In this way, Lyle's funds of knowledge for sports and his discoveries from various affinity spaces (e.g., sports, gaming) influenced his reading choices. Such connections between interests and reading choices are not new; but the connections among and across Lyle's literacy practices suggest that the confluence of multimodal literacies that impact gaming can also affect more traditional practices, such as reading a book. The threading of principles and understandings seems to make learning dynamic and relevant.

In a similar vein, when 12-year-old James spoke about reading, he focused on a gamified, engaging practice. "Battle of the Books" was a voluntary school-wide and cross-county competition: "You have five people in your group and you each have to kind of, you all have to read a certain amount of books. There's a list of 15 books. And each person has to read like three books and they ask you questions... And then at

the end, whoever gets the most points won.” Winners of the competition received trophies, and their picture was printed in the local town paper. Certainly, intrinsic and extrinsic factors motivated James, but what’s equally important is the impact of the gamified situation and the affinity space (the tournament) had on James’s reading. Though James had tests in English class, his overall level of engagement was heightened by and for the competition: “Well reading it for school, I don’t think I was fully paying attention all the time.” Reading for school was an isolated event and a requirement, whereas reading for Battle of the Books was a voluntary, team effort with levels (much akin to Lyle’s sports brackets) and various rewards. More so, problem-solving, critical thinking, and engagement were key factors in both the Battle of the Books and sports bracketing, suggesting that James and Lyle were involved in higher-level thinking as they applied their knowledge within and/or across contexts.

What This Means for Classroom Practice

Often the discussion of video gaming and learning focuses on gaming as a learning tool both in and out of the classroom; data from extant studies have indicated ways that video games complement and “bridge” traditional literacies (O’Brien & Scharber, 2008; Squire, 2009), provide a context for developing knowledge of vocabulary and historical facts (Abrams, 2009, 2012), and serve as a vehicle to help students develop writing skills (Gerber & Price, 2011). Equally important, however, is the investigation of the elements that mediate game play and nourish and sustain engaged learning. The data featured in this current discussion suggest that the nuances of video game learning (beyond game play) provide insight into the innovative and dynamic practices that inform students’ out-of-school learning.

Across the discussions of J.D., Lyle, Garret, and James, it is clear that the confluence of literacies impacted both gamified and traditional learning and choices. Further, as we see from the examples above, innovative learning stemmed from the interconnections among the students’ practices that were *not treated as isolated events*. Rather, students seemed to perceive the interrelationship among their literacies. Meaning-making became *threaded* across practices because the students saw the dynamic application of information and/or skills.

When we consider classroom learning and ways to embrace this interconnectedness among students’ practices, we need to contemplate the relative congruent functions of literacies. Learning in the digital age is “based on intuition, experimentation, and discovery” (Jukes, McCain, & Crockett, 2010), and students like J.D., Lyle, Garrett, and James almost automatically anticipated and/or sought connections among their often gamified activities; the overlapping or merging of knowledge and skills seemed to be inherent and natural approaches that helped students develop their learning trajectories. Overall, threaded, innovative learning inspires and empowers students to (re)design and reconceptualize their literate activities both on and off the screen, and classrooms need to be flexible spaces that provide opportunities for students to merge multiple practices and mediate connections to rich contexts and meanings.

References

- [1]. Abrams, S.S. (2009). A gaming frame of mind: Digital contexts and academic implications. *Educational Media International*, 46(4), 335-347.
- [2]. Abrams, S. S. (2010). The dynamics of video gaming: Influences affecting game play and learning. In P. Zemliansky & D. Wilcox (Eds.), *Design and Implementation of Educational Games: Theoretical and Practical Perspectives*. IGI Global.
- [3]. Abrams, S.S. (2012). Video gaming and education: Key elements that foster active learning and critical thinking (pp. 35-37). In J. Rowsell & K. Pahl (Eds.), *Literacy and Education: Understanding the New Literacy Studies in the Classroom*, 2nd Edition. Sage.
- [4]. Abrams, S.S., Gerber, H., & Burgess, M. (2012). Digital worlds and shifting borders: Popular culture, perception, and pedagogy. In B. Williams & A. Zenger (Eds.), *Participatory Popular Culture and Literacy Across Borders*. Routledge.
- [5]. Alliance for Excellent Education. (2012). The digital learning imperative: How technology and teaching meet today’s education challenges. Retrieved from <http://www.all4ed.org/files/DigitalLearningImperative.pdf>
- [6]. Alvermann, D. E. (Ed.). (2010). *Adolescents’ online literacies: Connecting classrooms, digital media, & popular culture*. New York: Peter Lang.

- [7]. Bilton, N. (2011). Video Game Industry Continues Major Growth, Gartner Says. NYTimes.com <http://bits.blogs.nytimes.com/2011/07/05/video-game-industry-continues-major-growth-gartner-says/>
- [8]. Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects (2010). Retrieved from http://www.corestandards.org/assets/CCSSI_ELA%20Standards.pdf
- [9]. Crawford, G. (2005). Digital gaming, sport and gender. *Leisure Studies*, 24(3), 259-270.
- [10]. Davies, J. (2006). Affinities and beyond! Developing ways of seeing in online spaces. *E-Learning*, 3(2), 217-234.
- [11]. DCMS & BIS (2009). *Digital Britain – the final report* Norwich: TSO
- [12]. Gee, J. P. (2007a). *What video games have to teach us about learning and literacy* (2nd ed.). New York: Palgrave Macmillan.
- [13]. Gee, J. P. (2007b). *Good video games and good learning*. New York: Peter Lang.
- [14]. Gee, J. P. (2011). *Social linguistics and literacies: Ideology in discourses* (4th ed.). New York: Routledge.
- [15]. Gee, J.P., & Hayes, E. R. (2011). *Language and learning in the digital age*. New York: Routledge.
- [16]. Gerber, H.R. & Price, D. (2011). Twenty-first-century adolescents, writing, and new media: Meeting the challenge with game controllers and laptops. *English Journal*, 101(2), 68-73.
- [17]. Gonzalez, N. Moll, L.C. & Amanti, C. (2005). *Funds of knowledge: Theorizing practices in households and classrooms*. Mahwah, NJ: Lawrence Erlbaum Associates
- [18]. Graham, F. (28 February 2012). What if you got paid to play games at work? BBC News. Retrieved from <http://www.bbc.co.uk/news/business-17160118>
- [19]. Gutierrez, K. (2006). *Culture Matters: Rethinking Educational Equity*. New York: Carnegie Foundation. iCivics. (nd). What is iCivics? Retrieved from <http://www.icivics.org/About>
- [20]. ICTC. (2011). *Digital Literacy: Canada's Productivity Opportunity*. Retrieved 6th October from http://www.ictc-ctic.ca/uploadedFiles/About_Us/ICTC_News/News_Items/ICTC_DL_E%20print.pdf
- [21]. IRA. (2009). New literacies and 21st century technologies: A position statement of the International Reading Association. *The International Reading Association*. Retrieved from http://www.reading.org/Libraries/Position_Statements_and_Resolutions/ps1067_NewLiteracies21stCentury.sflb.ashx
- [22]. Jukes, I., McCain, T., & Crockett, L. (2010). *Understanding the digital generation: Teaching and learning in the new digital landscape*. Kelowna, Canada: 21st Century Fluency Project.
- [23]. Kajder, S. (2010). Adolescents and digital literacies: Learning alongside our students. Urbana, IL: NCTE.
- [24]. Kapp, K. M. (2012). *The gamification of learning and instruction. Game-based methods and strategies for training and education*. San Francisco, CA: Pfeiffer.
- [25]. Knobel, M., & Lankshear, C. (2010). *DIY media: Creating, sharing, and learning with new technologies*. New York: Peter Lang.
- [26]. Malliet, S. (2006). An exploration of adolescents' perceptions of videogame realism. *Learning, Media and Technology*, 31(4), 377-394.
- [27]. McGonigal, J. (2011). *Reality is broken: Why games make us better and how they can change the world*. New York: Penguin.
- [28]. Moll, L.C., Amanti, C., Neff, D. & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory into Practice*, 31(2), 132-141.
- [29]. NCTE framework for 21st century curriculum and assessment (2008). National Council of Teachers of English. Retrieved from <http://www.ncte.org/governance/21stcenturyframework>
- [30]. O'Brien, D. & Scharber, C. (2008). Digital literacies go to school: Potholes and possibilities. *Journal of Adolescent & Adult Literacy*, 52(1), 66-68.
- [31]. OECD (2009). PISA assessment framework: Key competencies in Reading, mathematics, and science. OECD publishing. Retrieved from www.sourceoecd.org/education/9789264059603
- [32]. Salen, K., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. Cambridge, MA: MIT Press.
- [33]. Sasso, B. (2012). Sandra Day O'Connor backs online game to teach kids about government. Retrieved from <http://thehill.com/blogs/hillicon-valley/technology/225315-sandra-day-oconnor-backs-online-game-to-teach-kids-about-government>
- [34]. Smith-Robbins, S. (2011). "This game sucks": How to improve the gamification of education. *EDUCAUSE*, 46(1).
- [35]. Self, C.L., Mareck, A.F., & Gardiner, J. (2007). Computer gaming as literacy. In C.L. Selfe & G.E. Hawisher (Eds.), *Gaming Lives in the Twenty-First Century: Literate Connections* (pp. 21-36). New York: Palgrave Macmillan.
- [36]. Squire, K. (2008). Video-game literacy: A literacy of expertise. In J. Coiro, M. Knobel, C. Lankshear, & D. Leu (Eds.), *Handbook of research in new literacies* (pp. 635-669). New York: Lawrence Erlbaum Associates.
- [37]. Squire, K. (2012). *Video games and learning: Teaching and participatory culture in the digital age*. New York: Teachers College Press.
- [38]. Steinkuehler, C. A. (2007). Massively multiplayer online games as an educational technology: An outline for research. *Educational Technology*, 48(1), 10-21.

- [39]. Steinkuehler, C.A. (2011). Video games and digital literacies. *Journal of Adolescent & Adult Literacy*, 54(1), 61-63.
- [40]. Suellentrop, C., & Totilo, S. (2012, October 3). Gaming faces its archenemy: Financial reality. *The New York Times*. Retrieved from http://www.nytimes.com/2012/10/07/arts/video-games/video-game-retail-sales-decline-despite-new-hits.html?_r=0