

Print this Meridian Article

Video Games: Why Kids Play and What They Learn

Jill M. Olthouse

Volume 12, Issue 1, 2009

View Online

<http://www.ncsu.edu/meridian/winter2009/olthouse/index.htm>

Abstract

This paper provides an overview of the relationship children and youth have with video games, giving special attention to concepts of “fun” and “learning.” Video games are introduced as a new media, and rationale is given for studying the relationship kids have with them. Motivation and learning are discussed in relation to video games, and the question is asked “Can an experience (like playing video games) be both fun and educative?”

Imagine a ten year old girl who comes home from school each day and devotes two to three hours to her favorite activity. If this activity is playing music, we might say the child has a passion. But if the child is playing video games, would we be more likely to call it an obsession? Is it only our perception that changes, or is there a fundamental problem with how children relate to video games? Video games are a relatively new media and, similar to television, they have attracted both negative and positive attention from scholars. While some scholars see video games as harbingers of educational utopia, saying “the young people of today understand instinctively that their games are their very best teachers” (Prensky, 2003, p. 3), others worry that we are *Amusing ourselves to Death* (Postman, 1985).

These conflicting views of video games may be due to the ways children relate to the games. This paper explores the relationship children and youth have to video games. In this exploration, video games are first introduced as a new media, and a rationale is given for studying the relationship kids have with them. Second, the appeal of video games is discussed including what it means to play and the motivational power of video games. A discussion of if and what children learn from video games follows. Finally, the relationship between fun and learning is explored.

What is the Rationale for Studying how Kids Relate to Video Games?

Kids and Video Games is a New Phenomenon

Video games have been in existence for only forty years. Thus, research into their effects on players is a fairly new field. Video games have the potential to affect a great number of people as their sales have begun to exceed those of movies. Video games combine film, graphics, sound, and text to communicate narratives and goals to the player. By communicating to the player in this manner, video games are drawing from previous forms of media, including symbols, spoken language, early writing, manuscripts, print, and video (Bruce, 2003). They can be considered one of the newest forms of media in the sense that they have the potential to communicate to a wide audience in a novel way. As the advent of the printing press and television journalism had the potential to change culture, so may video games for the next generation.

While video games incorporate previous media, they also differ from traditional media, largely due to the forced interactivity incorporated into video games. Video games contain frequent pauses in the form of directives to the player; find this object, battle this opponent, solve this puzzle. This interactivity offers both an element of choice (the player has a role in the development of the storyline) and paradoxically, influences the storyline, as the player is forced to respond in certain predetermined ways in order to succeed and advance the storyline. Thus, these choices introduce sporting elements to the media which includes reaction times, strategy, and competition which are generally not found in traditional media. Video games also differ from other media in their ability to adjust to the player's learning ability by relying on the computer's artificial intelligence. This means that players have the opportunity to experience more successes than they might have if they were playing a board game against someone who is more advanced. For some players, this may keep them engaged longer as they receive feedback that they are continually making progress. These types of feedback and reinforcements may have a profound influence on why some children spend such a great amount of time with this media. Investigating the ways in which children interact with video games may have the potential to provide insight into how these children are accustomed to processing information differently than children of the TV or print generation.

Kids and Video Games are a Diverse Phenomena

While the stereotype of video games as simulated fantasy violence rings true for some games, the category of video games is composed of an increasing diversity of genres. By understanding the diversity of video gaming experiences, the stereotypes of children who play video games may be avoided. Plus, different genres of video games appeal to and emphasize different capabilities. One of the oldest types of video game is the arcade or platform game. These games emphasize quick reflexes and hand-eye coordination as players hop from cloud to cloud and blast monsters. The storylines in these games, in general, are rather simple and can be considered in the fantasy realm. Sports games, such as *Madden NFL* or the *Tony Hawk* series of skateboarding games, simulate the competitive action of real sporting events. Role playing games, patterned after the popular *Dungeons and Dragons* series, are characterized by players selecting to play as one of various humanoid characters or fantasy professions and engaging in

quests, gaining skills and power as they progress. Puzzle games rarely have a storyline. Rather, players must use logical deduction to find patterns. Examples of puzzle games are chess and Sudoku. Another prominent genre is the first-person shooter (e.g. *Halo*, *Doom*). In first-person shooter, play progresses from a first-person point-of-view, and players shoot at humanoid enemy combatants. Many of today's games contain elements of a variety of genres.

Kids and Video Games are a Growing Phenomenon

The variety of video game genres speaks to their popularity with an increasingly diverse audience. Playing video games is an especially prominent leisure activity of children and young adults. The popularity of video games among children indicates that a large number of children have a shared cultural experience that the older generation may have difficulty relating to. A survey of Australian children found that 64% had played electronic or computer games (Australian Bureau of Statistics, 2006) while a study of children in the United Kingdom found that 85% of the children polled played computer games at least once every two weeks (Sanford et al. 2006, as cited in de Freitas, 2006). Compare this to 72% of teachers who never play computer games in their leisure time, and we can see a generation gap (Sanford et al., 2006, as cited in de Freitas, 2006). Despite not playing games as a leisure activity, there is evidence that 36% of primary school teachers and 27% of secondary school teachers are already using games in the classroom (Sandford et al., 2006, as cited in de Freitas, 2006). Perhaps these teachers have experienced the pedagogical value of using games in the classroom. Perhaps they feel obliged to relate to students' culture by appealing to their sense of fun.

What is it that Draws Kids to Video Games?

Video games are fun. Although this premise can, and will, be challenged, for now let us assume that if video games were *not* fun, they would not be the leisure activity industry whose earnings surpass those of motion pictures. The question for teachers is *why* are they fun; so fun that some children persist for such stretches of time that even the consoles themselves plead with them to take a break. This question can be, in part, answered by viewing video games as play, reinforcement, social interaction, fantasy, and cognitive exercise.

Video Games as Play

Video games may be considered a form of play. Callois (2001) describes the conditions that define games and make them enjoyable. Perhaps the most important of these conditions is that games are activities in which players participate only voluntarily. No matter how appealing an activity may be, it loses some of its appeal when one feels forced to do it. Secondly, games are unproductive, in the sense that they create neither goods nor wealth. If they did, play might become a means to an end rather than the object of delight in its own right. Games are governed by rule systems, which depart from the rules of everyday life. In addition, games contain elements of fantasy. In

today's video game era, electronic games meet these same qualifications that were defined for traditional games years ago.

Video Games as Reinforcement

A behavioral psychologist might answer the question “Why are video games fun?” by pointing to the carefully crafted set of reinforcements underlying game play. Eglesz, Feteke, Kiss and Izzo's (2005) investigation of the motivations of video game players summarized the findings of other researchers who found that variable ratio schedules of rewards are more efficient than fixed ratio schedules, but only if the reward also changes with the difficulty. Games with variable ratio schedules would reward players with bonus points or prizes, not after a fixed number of victories, but after a random number of victories. This type of reinforcement schedule was found to motivate players more, but only if the prizes increased in value each time. Aversive conditioning also proved to be good motivation for players. This means that players were motivated to avoid unpleasant events in the game, such as the loss of life points.

Video Games as Social Interaction

A social learning theorist might answer the question why video games are fun by pointing to the social motivations of video games. These include competition, cooperation, communities, tribes, and teams. Online gaming, especially, delivers a social environment in which bands of players defeat their rivals. Bands must develop strategies that capitalize on individual strengths, and communicate with each other as they carry out their plans, in much the same way that athletes in team sports must rely on each other to win. Scientists at Rochester University surveyed one thousand video game players and found that the psychological need for connection to other players was one of the top three motivators for video-game players (Dickman, 2006).

Video Games as Fantasy

Behaviorism and social interaction do not fully explain the allure of the fantasy elements of the game. Clark Aldrich, who has designed educational simulations and written widely on games and simulations in education, has a long list of game elements which make these educational simulations enjoyable (2005). Among the fantasy-related elements are mixed scales (size is different in the game than in reality), heroes, shopping, bringing order from chaos, choosing your avatar's appearance, genre features, and conflicts. These are all elements which create a powerful narrative that removes the player from reality (Aldrich, 2005).

In video games, multimedia sights and sounds enhance the narrative. These include songs, graphics, sound effects, and an interesting virtual environment. In essence, games can deliver everything that a movie can in terms of escape from reality. However, unlike movies, players in games become joint storytellers with the game developers, as their choices create a unique storyline in what Gee (2006) refers to as

“performance art.” This interactivity, combined with visual and auditory stimuli, makes the fantasy feel real.

Video Games as Cognitive Exercise

The cognitive scientist may point out that much of the fun in video games can be considered intellectual. Game elements that cause our neurons to fire include strategy, mysteries, puzzles, and multiple skills levels (Aldrich, 2005). Often video games include simple cyclical skills that players need to repeat again and again in order to master, such as pushing A and B in quick succession or identifying a musical note. As the player repeats the simple skill, he or she improves and feels the reward of having learned something, even if that isolated skill has little value outside the particular gaming world. This is evident in video games that claim to improve your entire brain, but, in actuality, improve skills like naming a reversed number, subtracting by seven, or counting blocks in a three dimensional arrangement. Many of today's game theorists, though, believe that games have the potential to teach us much more, including multi-tasking, perceptual skills, and perhaps even social consciousness (Bogost, 2007; Prensky, 2003).

Video Games' Appeal at Different Ages

The fun of video games stems from a variety of motivations. A survey of children who play video games suggests that different motivations for playing come to the fore at different ages. Researchers believe that children between the ages 14 and 18, the largest group of gamers, use the games as an emotional release (Eglesz et al., 2005). Gamers can form alternative identities and create social bonds within the make-believe world of the game, which may ease the pain of puberty. Playing in these video game environments, they feel an acceptance of self. Children in this age range can also seek stimuli and take risks in action-packed genres. Younger children prefer games that provide immediate positive responses (Eglesz et al., 2005). They do not speculate nor appreciate drawn-out strategy. Instead, they want to succeed as quickly as possible by amassing reward points and collecting game objects. Researchers suggest that these types of victories are important to young children in the same way that getting an A on a paper is important to them because they are both concrete manifestations of the child's accomplishment (Eglesz et al., 2005).

Video Games as Unappealing Experiences

There are many elements that draw children and young people to video games. Yet, some of these same characteristics can also turn some kids off. Yee (2006) argues that video games have too much motivational power; they are designed to induce players to pay a monthly fee to slave over their monitors for hours at a time. He specifically refers to massively multiplayer online role-playing games. These games have become so complex that they mimic real professions (Yee, 2006). For example, to become a pharmacist in a *Star Wars* game, a player must devote three to six weeks of normal game play to acquire the ability to be competitive in the pharmaceutical market which

requires daily time investment to keep the business in good working order. According to Yee (2006), the average online multiplayer role-playing gamer spends twenty-two hours per week playing. These players often have responsibilities within the social groups online, and other players depend on them to fulfill these responsibilities in order to keep the team or guild competitive. This responsibility and constant playing can begin to feel obligatory and less like play (Yee, 2006).

Even to the casual player, all video games do not hold the same appeal. Different players will gravitate towards different game genres and different games within these genres. Some serious topics, such as disease, are not considered fun to some players (Aldrich, 2005).

What is it that Kids Take Away from Video Games?

The motivational power of video games has the effect of seducing players to play for long stretches of time. However, what are the other effects of playing video games? Increasing amount of graphic violence in video games, combined with suppositions about the connection between such video games and school shootings, leads many educators to wonder exactly what children and young adults are learning from long hours of play. Such discussions, though focused on learning, often contain an implied moral question: Are video games helping or hurting our youth?

New Technologies and Learning

Learning generally promotes positive connotations. Some video games that are marketed as “educational” often capitalize on only the stingiest of definitions of learning: simple skill and drill memorization. However, learning also involves asking questions, problem solving, and working with others. In this paper, “learning” implies a change in skills or attitudes. Some of this learning may be positive, furthering independence, and other may be negative. To learn implies coming into a maturity and independence of thought. Do new technologies have the potential to teach in this sense, or are they more likely to be mis-educative, that is, to develop dependence and reflexive, unthinking behavior? Neil Postman (1993) suggests that of new technologies in education, the question should always be asked, “What problem does this new technology solve?” Are video games the best solutions for certain problems in education, or do they simply create more problems?

How do Games Teach?

Video games, while designed primarily for entertainment, contain some pedagogical features. The pedagogical elements of games include background scenarios (such as relevant historical context in a WWII battle simulation), scaffolding, diagnostic capabilities, debriefing, forced moments of reflection, libraries of successful and unsuccessful plays, chat rooms, tests and quizzes, mnemonic devices, and pop-up prompting (Aldrich, 2005). In educational video games, it is hoped that the skills learned in the game will transfer to other contexts.

In addition to teaching game-related skills, video games also present certain sets of values. Games theorist and designer Ian Bogost (2007) believes games teach through implied rhetoric. In order to succeed in a game, the player must accept the power structures and values the gaming world provides. For example, to succeed in a first-person shooter game, the player must solve conflicts by killing as many opponents as fast as possible. Bogost has taken advantage of the rhetorical aspect of video games by building a company that produces "persuasive games," or games with agendas. One game he designed is called *Take Back Illinois*. The goal of the game is to take back Illinois for the Republicans. In order to succeed at managing the on-screen Illinois, the player must make decisions that are consistent with Republican party platforms, such as capping medical malpractice suits. When asked if he is brainwashing people with games like these, Bogost responds: "You're forced to understand the position to be successful. But you have the opportunity to immediately reject it" (Quirk, 2006, p. 58). Bogost indicates that video games can teach players to reflect on and critique underlying values.

What Positives do Video Games Teach?

Due to the potential for video games to teach, many educators and game theorists see a hopeful role for the intersection of video games and education (e.g. Gee, 2003; Prensky, 2003; Trindade, Fiolhais, & Almeida, 2002) . They argue that the structure of today's video games requires certain types of learning that are very beneficial to students, specifically metacognition, computer skills, and perceptual skills.

Players learn how to learn by playing videogames (Gee, 2003; Prensky, 2003). One way in which video games teach metacognition is by requiring players to understand systems. Many video games are based on a systems model. Variables within the game interact according to predetermined rules, rules the player must discover and understand to become successful. These systems include symbols systems, value systems, and mathematical systems, among others. To solve the complex problems that the systems provide, players may need to break big problems down into smaller steps, master a set of subskills, or pass through a number of increasingly difficult levels. In this manner, players learn that taking on a large challenge is a matter of breaking it down into smaller steps. Players also learn the metacognitive skill of persistence through difficulties. In many games, success depends on searching for clues, asking for advice, and trying a variety of strategies. Furthermore, players learn, through multiple character deaths, that mistakes may be necessary for success (Aldrich, 2005).

In multiplayer games, players learn metacognitive skills and how groups of players think. Results from a survey of 4,000 massively multi-player online role-play game participants indicate that more than half of those surveyed learned mediation and leadership skills as they worked with other players to accomplish game goals (Yee, 2003, as cited in de Freitas, 2006). Other skills that video games can develop are perceptual and motor skills, specifically visual selective attention, and visual-spatial skills (Green and Bavelier, 2003, as cited in de Freitas, 2006; Trindade, Fiolhais, & Almeida, 2002). A study by Sanford (2006, as cited in de Freitas, 2006) found that 63%

of teachers thought video game players learn higher order thinking skills and 62% thought players learn specific content knowledge from playing educational video games.

What Negatives do Video Games Teach?

While some educators laud video games for their instructional potential, others worry about the negative effects of playing video games (Provenzo, 1992). Early opponents of video games claimed that the games were addictive, costly, led to aggressive and anti-social behavior, and discouraged imagination (Anderson & Ford, 1986). Specific to what players *learn* from playing video games, two of the main criticisms are that players learn aggressive behavior and stereotypical gender representations (Provenzo, 1992).

A number of experimental studies have been conducted in an attempt to determine if playing violent video games results in aggression (Anderson & Bushman, 2001; Dill & Dill, 1998; Griffiths, 1999; Sherry, 2001). These experiments typically take the form of assessing young people's play behavior through observation or their thoughts through a questionnaire, allowing the participants to play violent video games for a short period of time, and then reassessing. These experiments yield conflicting results, as have reviews of these experiments. While Dills and Dills' (1998) review found evidence of causal relationship between video games and violence, Griffiths's (1999) review of the experimental research argues that methodological problems in the experiments prevent a clear conclusion.

In 2001, two meta-analyses on the relationship between violence and video games were conducted. Anderson and Bushman's (2001) meta-analysis of thirty-five studies found a positive correlation between violent video games and aggression ($r = .19$). In addition, violent video games were found to be negatively correlated with pro-social behavior ($r = -.17$) and positively correlated with physiological arousal ($r = .22$). Also, a positive correlation ($r = .18$) was found for both increases in aggressive thoughts and affect. Sherry's (2001) meta-analysis of twenty-five studies calculates the correlation between video game play and aggression as $r = .15$, which is smaller than the correlation, found for television and violence ($r = .31$) (Paik & Comstock, 1994). This study also found that fantasy and human violence resulted in greater aggression than sports violence. Interestingly, effect size was negatively related to playing time when comparing a playing time of 10 minutes to a playing time of 75 minutes. This brought up issues of arousal and catharsis. Does playing a video game initially cause arousal, and then result in catharsis of those emotions? Sherry (2001) also found that hostile feelings were aroused more often than hostile behaviors.

Longitudinal measures are absent from these meta-analyses, which restricts the conclusions that can be drawn from them. Yet, they indicate that playing violent video games, especially for a short period of time, increases physiological arousal and aggression. However, not much is known about the differences between types of games and how long term play affects these gamers.

A second issue that concerns critics is the preponderance of gender stereotypes in video games. The majority of video game players, as well as characters, are males, although the trend is changing. Video games designed for the male audience have traditionally cast females in the role of victims to be rescued (Provenzo, 1992) or supporting characters rather than the heroes. Regardless of whether females are cast as victims or heroes, the females are presented with exaggerated body images, including huge breasts and tiny waists, wearing provocative but highly dysfunctional “armor,” and accessorized with huge weapons and long, swinging hair. Discussions of female heroines, such as *Tomb Raider's* Lara Croft, are “often reduced to trying to decide whether she is a positive role model for young girls or just that perfect combination of eye and thumb candy for the boys” (Kennedy, 2002, ¶ 1).

How Effective are Games at Teaching?

There is debate about whether video games are teaching children skills and values that will help them and the necessary presupposition for this debate is that video games are effective at teaching the skills and attitudes they convey. Evidence suggests that this may be the case. In the case of content-specific skills, computer tutoring programs have been found to be more effective than classroom instruction, but not as effective as human tutors (Kelly, 2005). Kelly (2005) concludes that this artificial tutor is twice as effective as typical classroom instruction, but only about half as effective as good human tutors. A literature review conducted by Gorrell (1992) found that computer simulations were effective at teaching procedural knowledge but not higher order thinking, and that learners enjoy learning through computer simulations.

Studies have also demonstrated the ability of computer simulations to improve attitudes. In one study, students were found to be more motivated to learn difficult symbolic language after experiencing a phenomenon visually through a 3-D simulation (Trindade, Fiolhais, & Almeida 2002). A Pentagon marketing survey (as cited in Quirk, 2006) found that thirty percent of young people who played the Army's *America's Army* video game had a more positive impression of the Army than before they played. This video game has become a powerful marketing tool for this reason.

A meta-analysis (Vogel et al., 2006) of thirty-two studies found that interactive simulations and computer games were more effective at teaching concepts, in both instructional value and motivation than traditional classroom instruction. This held true for both males and females of ages ranging from elementary school to college.

On the Intersection of Learning and Fun

Because video games are an appealing leisure activity for many youth and they contain features that help players develop a sense of increased mastery, some theorists have called for video games to be incorporated into education (Aldrich, 2005; Oblinger, 2004). However, in certain cases, this pursuit of fun actually hurts students' learning. For example, video games can be considered miseducative when the learning goals are not clear or when an alternative teaching method is a better way of presenting

information. But when goals of the game and the learning goals match such that the player is engaging in metacognitive practices, playing video games could be both educative and fun.

Aldrich (2005) notes the teachers' dilemma. He explains that teachers, noticing how bored students are in their classroom (and conversely, how engaged they are in video games when they get home), desire to make their classrooms more like a computer game. To some extent, this is a vain ambition. Children enjoy playing video games because they are not school; they can revel in the pointlessness and fantasy. When students do not choose the games they play, when they are aware that the games serve an educational purpose, and when they are asked to reflect on the games or are graded on their participation, the "fun" value goes down.

This may point to a deeper problem of trying to bring fun into education. Play, as defined in this paper, is self-motivated, governed by fantasy rules, and removed from everyday life. Learning is more akin to work. Work requires purpose, demands goals, takes effort, engenders frustration, and bears fruit. Pursuing fun is like pursuing happiness. Happiness is elusive when pursued for its own sake, but often comes to us in pursuit of meaningful goals. Similarly, fun in the short term does not always equate to long-term joy.


There is a middle ground where fun and learning intersect. This state of coexistence between work and play has been described as "flow" by Csikszentmihalyi (1990). Flow is described as the psychology of optimal experiences, characterized by clear goals, appropriate challenge level, loss of self into the focus on activity, distorted sense of time, personal control, and intrinsic rewards. In this description of flow, we can see that someone might be having fun and also learning. For example, a small child engaged in fantasy play is also learning about adult roles at the same time. The description of flow also matches the experiences of people who play video games. One gamer remarks, "If you're absorbed in the game and you like it [gaming] oftentimes you find that hours have gone by and didn't even realize that much time has passed. (F. Curry, personal communication, October 27, 2007).

In judging whether playing video games can be both fun and educative, determination is largely dependent on the interaction of the player and the context. The medium of video games, at its core, is simply graphics accompanied by a hyperlinked narrative, and an underlying mathematical system. As such, the final format can evolve in a hundred directions. Video games may be good quality or poor quality, just as words on a page may be transformed into a novel or an advertising jingle. A video game may take the form of a chess tutorial, a language instruction program, a medieval fantasy, or an instructional course in cop killing. Thus, video games and their effects cannot be judged as a whole.

Similarly, different players will respond differently to different titles. For example, while most people who play violent video games might display aggression, many will not, just as many people who watch crime dramas or read Stephen King novels will not become

violent. Instead of asking, “Are video games fun and educative?” the questions that should be asked are: “In what contexts and with which students are video games fun and educative?”, “To what extent do players examine the values in the video games and question them?” and “In what contexts do skills learned in video games transfer to other areas?” These questions provide a basis for future research into how children relate to video games.

About the Author

 A portrait photograph of Jill M. Olthouse, a woman with short brown hair and glasses, wearing a white and black striped shirt. She is smiling and looking directly at the camera.	<p>Jill M. Olthouse is a graduate assistant and doctoral candidate in Gifted Education at the University of Toledo. Her interests are giftedness, composition studies, and educational technology.</p> <p><u>Email Jill M. Olthouse</u></p>
--	--

References

Aldrich, C. (2005). *Learning by doing: A comprehensive guide to simulations, computer games, and pedagogy in e-Learning and other educational experiences*. San Francisco, CA: Jon Wiley & Sons Inc.

Anderson, C. A., & Busham, B. J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A metanalytic review of the scientific literature. *Psychological Science, 12*, 353-359.

Anderson, C. A., & Ford, C. M. (1986). Affect of the game player: Short term effects of highly and mildly aggressive video games. *Personality and Social Psychology Bulletin, 12* (4), 390-402.

Australian Bureau of Statistics. (2006). *Children's Participation in Cultural and Leisure Activities*. Retrieved from <http://www.abs.gov.au/Ausstats/abs@.nsf/Lookup/0B14D86E14A1215ECA2569D70080031C>

Bogost, I. (2007). *Persuasive games: The expressive power of videogames*. Cambridge, MA: The MIT Press.

Bruce, B. C. (2003). *New Literacies. Literacy in the information age: Inquiries into meaning making with new technologies*. Newark, DE: International Reading Association.

Callois, R. (2001). *Man, play and games*. Chicago: University of Illinois Press.

Csikszentmihalyi, M.(1990). *Flow: The psychology of optimal experience*. New York: Harper Perennial.

de Freitas, S. (2006). *Learning in immersive worlds: A review of game-based learning*. JISC. Retrieved October 1, 2007 from http://www.jisc.ac.uk/media/documents/programmes/elearninginnovation/gamingreport_v3.pdf

Dickman, S. (2006). A reason why video games are hard to give up. *University of Rochester News* . Retrieved September 29, 2007 from <http://www.rochester.edu/news/show.php?id=2719>

Dill, K. E., & Dill, J. C. (1998). Video game violence: A review of the empirical literature. *Aggression and Violent Behavior, 13* (4), 407-428.

Eglesz, D., Feteke, I., Kiss, O. E., & Izso, L. (2005). Computer games are fun? On professional games and players' motivations. *Educational Media International, 42* (2), 117-124

Gee, J. P. (2003). *What video games have to teach us about learning and literacy* . New York: Palgrave MacMillian.

Gee, J.P. (2006). Why Game Studies Now? Video Games: a New Art Form. *Games and Culture. 1* (1). 58-61.

Gorrell, J. (1992). Outcomes of using computer simulation. *Journal of Research on Computing in Education, 24* (3), 359-347.

Griffiths, M. (1999). Violent video games and aggression: A review of the literature. *Aggression & Violent Behavior, 4* (2), 203-212.

Kelly, H. (2005). Games, cookies, and the future of education. *Issues in Science and Technology, 21* (4), 33-41.

Kennedy, H. W. (2002). Lara Croft: Feminist icon or cyberbimbo? On the limits of textual analysis. *Games Studies*, 2(2).

Oblinger, D. (2004). The next generation of educational engagement. *Journal of Interactive Media in Education*, 8, 1-18.

Paik, H., & Comstock, G. (1994). The effects of television violence on antisocial behavior: A meta-analysis. *Communications Research*, 21 (4), 516-546.

Postman, N. (1985). *Amusing ourselves to death: Public discourse in the age of show business*. New York: Viking.

Postman, N. (1993). Of luddites, learning, and life. *Technos Quarterly for Education and Technology*, 2 (4).

Prensky, M. (2003). Digital game-based learning. *ACM Computers in Entertainment*, 1 (1), 1-4.

Provenzo, E. F. (1992). The video generation. *American School Board Journal*, 179 (3), 29-32.

Quirk, M. (2006). Fun and friendly persuasion. *National Journal*, 38 (29), 58-59.

Sherry, J. L. (2001). The effects of violent video games on aggression: A meta-analysis. *Human Communication Research*, 27 (3), 409-431.

Trindade, J., Fiolhais, C., & Almeida, L. (2002). Science learning in virtual environments: a descriptive study. *British Journal of Educational Technology*, 33 (4), 471-488.

Vogel, J., Vogel, D. S., Cannon-Bowers, J., Bowers, C. A., Muse, K., & Wright, M. (2006). Computer gaming and interactive simulations for learning: A meta-analysis. *Journal of Educational Computing Research*, 34 (3), 229-243.

Yee, N. (2006). The labour of fun: How video games blur the boundaries of work and play. *Games and Culture*, 1 (1), 68-71.