The Effect of Video Game Use in Adolescence on Academics and Problem Solving Skills

Bryce Hargis

California Baptist University

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Abstract

Video games are a common recreational activity, especially among adolescents. The relationship of video game use with academic performance and problem solving skills is of particular interest to researchers. Researching the positive effects of video games is a relatively new field of study. As a result, many studies do not properly account for the different genres of video games. Most studies still rely on questionnaires to acquire their data. Future research methods involve stealth assessment through modifying the game. The effects of different game genres is also an area that requires future research.

 *Keywords:* video games, problem solving, problematic use, academic performance

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**Introduction**

 Video game use is an increasingly common form of recreation among adolescents. The current research must be examined to determine the relationship, if any, between video game use in adolescence with academic performance and problem solving skills. There is a current lack of research on how video game use effects problem solving skills. Most research on academic effects focuses on academic performance and neglects to investigate the effects on academic and study skills. There is also a lack of quality longitudinal studies on the subject. The current research heavily investigates academic performance. Most of the research is prudent in accounting for other external factors that can effect academic performance outside of video games. There are a few studies that investigate media use and its relationship with negative behaviors like violence. A stable longitudinal research model must be developed for future quantitative research, like the one in Adachi and Willoughby’s work in 2013.

 A fair amount of previous research has lumped together television screen time with video game use. An example of this is Ferguson’s article from 2011. A behavioral measure survey was given out to a population of over 600 children. The questionnaire included reports on behavioral issues, school performance, family environment, and television and video game use. Ferguson discovered that there was no strong prediction between television and video game use with poor academic performance or attention issues. Other traits were shown to be predictive of these problems, like antisocial traits or anxiety. Future research should take these factors into account when investigating negative effects of video games, like violent behavior.

 Ferguson continues to research in this area later in 2015. He lays out common problems current research on video game use, violence, and academic performance. Examples of problems are not matching the qualities of the video games played or not controlling for other variables, like the traits mentioned in their previous article. Ferguson analyses each of the limitations he describes in depth. Many previous studies were analyzed and their methods compared. The researcher notes that poorly designed studies can manipulate the overall meta-data in the analysis. He implores future researchers to investigate new theories, research methods, and analysis of video games that are not violent.

**Evaluation Methods**

 There are only a few longitudinal studies in this research area. One such study was performed by Adachi and Willoughby in 2013. These researchers used self-assessment tools with a group of adolescents as they progress from 9th to 12th grade. Problem solving skills, academic grades, strategic video game play, and fast-paced video game play were assessed during the study. There was a strong correlation between strategic video game play and problem solving skills. However, the researchers acknowledge that the direction of this link is unclear from this particular study because the assessments were not frequent enough to see if the game use or problem solving skills rose first. There was no significant link found between fast-paced video game use and problem solving skills (Adachi & Willoughby, 2013). This study is significant because it provides a strong model for future longitudinal studies in this area.

 Another evaluation method for video game use is stealth assessment. The researchers Shute, Wang, Greiff, Zaho, and Moore (2016) conducted a problem solving skill test by using in game determinants to measure these skills. The researchers identifies indicators within the game that would point to problem solving skills, and then measured for these in the background. The participants played a slightly modified version of the game so that the researchers could add their tracking into the game. This study is a superior example of how to better study video game use. Being an interactive medium, researchers can potentially alter the code of a game to measure certain indicators, as these researchers did. This method seems to be reliable and also removes most of the unreliability that comes from self-assessment questionnaires. Modifying games like this has incredible potential for conducting future research, as long as the correct types of games are used.

**Game Qualification**

 Qualifying the types of games played is a necessity in this field of research. Like other media, video games can differ wildly in content across different genres. A comprehensive approach to qualifying these games was used by Bijvank, Konijn, and Bushman (2012). They measured the violence, wishful identification, realism, and immersion of the games played as perceived by their participants. The researchers noted a correlation between low educational ability and a preference for violent video games, as they hypothesized. A shortcoming of the study is a bias in the sample question about violence. The example response item is I think it is great that I can kill people in my video game (Bijvank, Konijn, & Bushman, 2012, p. 156). The participants’ enjoyment of violent options in the video game is not the best indicator of the violence level within the game.

 The importance of categorizing video game use is showcased in the article from Busch, Loyen, Lodder, and Schrijvers (2014). These researchers performed a general overview on current research investigating academic performance and different experiences, such as bullying or excessive Internet usage. The academic effect of internet and video game use was filled with complex results. The researchers suggest that these effects should therefore be interpreted in the context of the kind of video game that is played. Video game use, when properly categorized, can serve as a predictor for behaviors other than violence. Fraser, Shane-Simpson, and Asbell-Clarke (2014) explore the link between problem-solving video game enjoyment and understanding of science. Their research suggests that teenagers’ video game preferences can mildly predict some social behaviors and school subject preferences. The researchers propose games focused on science can help reinforce perceived science competency in a student.

**Problematic Use**

 Problematic use of video games can serve as warning against potential substance abuse, as suggested by Gallimberti et al. (2016). Like other recreational activities, video game use can become problematic and detract from other important life events. Their research advised on different variables that can predict problematic video game use, like high energy drink consumption or disrespect for rules. However, they also found that competitive sports and getting daily vegetables lowered the chance of problematic video game use (Gallimberti et al., 2016). Understanding problematic video game use is important for future research. Problematic use is distinctly negative, while responsible use may have positive effects.

 Understanding the motivation behind video game use is important to utilize the positive effects of video game use, if they are prominent. Hamlen challenges the previous assumption that children play video games to get away from mental stimulation (2013). On the contrary, they suggest that children are motivated by the thinking and challenge that is present in some video game. It also seems in their research that the more creative children tend to shy away from video game play, although video game use itself does not seem to diminish creativity. Different video games can have different rules and motivation systems for the player. Because of these differing potential effects, it is important to categorize video games properly when studying them.

**Video Games as a Tool**

 Using video games as a direct tool to improve problem solving skills and academic performance is a relatively new area of study. Educational games show promise in improving these skills when designed and implemented properly. A possible framework for this is laid out in the research by Barab, Gresalfi, and Ingram-Goble (2010). They suggest that effective educational games should model themselves after transformational play. Transformational play is defined by the researchers as having the player in a position of control, having content that is legitimate and believable, and creating context with consequences for the player to consider. Like how strategic and fast-paced video game use saw different results in Adachi and Willoughby’s study (2013), educational games crafted specifically for its purpose may be more effective when compared to a generic game. This supports what Blumberg, Altshuler, Almonte, and Mileaf (2013) suggest at the end of their article. They suggest that the benefits of video game play may be difficult to generalize to other tasks. They reference an article where participants who played *Tetris* were better at mental rotation afterward, but only when *Tetris­-*like shapes were used. Therefore, effective educational video games should be created in a way that allows generalization to life and academic situations. These educational video games will serve as a tool that is crafted for a specific purpose.

 An example of specific video game use as a tool is provided by Coyle, Doherty, and Sharry (2009). They designed a computer game specifically to use in adolescent mental health care and intervention. While this study is not investigating problem solving or academic skills, it provides a quality example of crafting a video game for a specific function. The researchers noted that many subjects engaged with the game more easily than they did with other methods during their care. This suggests that there may be students who will also engage better with an educational video game when compared to other methods of engagement.

 Another example of specific video game use is performed by Elizabeth M. King (2015). An after-school learning program is developed using a video game type known as a Massively Multiplayer Online Role-Playing Game, or MMORPG. They identified that MMORPG’s may be suited to developing social and workplace skills because of their social component. This study is an outstanding example of capitalizing on the details of a gaming genre. Players of the game can cooperate based on their personal interests, which provides extra motivation for the youth to keep playing in the after school club. These social components enhance the learning aspect of the game as players cooperate on questions and are motivated by the game to continue to learn more.

**Future Research**

 Most of the literature discusses direction for future research in their end sections. One such example is at the end of Adachi and Willoughby’s work in 2012, titled “Do Video Games Promote Positive Youth Development?” They point out that there is a multitude of research on the negative effects of video games, but little research on potential positive effects. They suggest future research can examine the response difference when comparing games against computer opponents versus games against human opponents. Ferguson provides eight different problems that future research must address, such as not controlling external variables well and interpreting results selectively to match the authors’ viewpoint (2015, p. 647-649). Problematic past research did not standardize their measures, nor did they ensure the results would be clinically valid.

 Engagement differences across cultures are another suggested direction for research. Granic, Lobel and Engels (2014) also introduce potential future research areas. They provide a graph that illustrates the different types of games, with “social” on the horizontal axis and “complexity” on the vertical axis. This illustration is used to convey that different video games have different effects, and must be investigated as such. They also describe potential emotional, social, and educational benefits of video games.

**Conclusion**

 The current research on the positive effects of video games is in its infancy. Assessment methods and scales are not standardized among the research, but certain methods show more promise than others. Current research points towards potential use for video games as a therapeutic tool and cognitive enhancer, but only when the medium is properly understood and used. This understanding can also help mitigate the possible negative effects of violent game use and problematic use. The field has seen rapid advancement in the last two years of research, such as the introduction of stealth assessment, and seems poised to develop rapidly in the coming years.

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