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Zachary Shanks

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By Zachary Shanks

When talking about the subject of video games, the most common misconception is that they are bad for you. However, there is a substantial amount of research that exists which counters that preconceived notion. Video games are one of the leading forms of entertainment in the world. The industry is booming, and almost every person has played at least one. Because of this, there is a potential for a lot of things when it comes to the applications of video games. A common narrative amongst parents is that if their child plays too many video games, their brain may rot, or something to that effect. However, this research shows that the contrary may be true if the correct methods are applied. There are studies that depict video games being used to help patients, children, elderly, etc. Video games are more than just entertainment; they are a tool. They are a tool that, if used correctly, can be greatly beneficial to the ones who use them. Video games have been tested and researched in the educational, medical, and business fields and have been proven to have positive results on the health of their players. Multiple universities, including the University of Colorado and Oxford University have conducted studies that have shown the potential as well as the applications of video games to improve the physical, emotional, and mental health of their players.

In terms of the potential effects on memory and an increase in comprehension, the list of benefits that video games can provide is extensive. Video games have been around for decades now and have been a phenomenon ever since their first installments. The current state

of the industry has evolved, but the underlying reason people play video games has stayed the same. The entertainment value of video games is unmatched and thus keeps all generations ready for the next installment. Nevertheless, what if video games had more to offer than just entertainment value? Jacinta Bowler of Science Daily states: "Because of their engaging experiences and enriching 3-D virtual environments, the same video games that have been played for decades by children and adults alike may actually provide our brain with meaningful stimulation" (Bowler, 2017).

Studies have been conducted for years using rodents in order to see if environmental enrichments can have positive effects on their neurological state. There has been great success in that field, and some of the results are enhancements in cognition and neuroplasticity, as well as alleviating the degenerating effects of age on the cognitive state. This is what led researchers Craig Stark and Dane Clemenson from UCI's Center for Neurobiology of Learning and Memory to experiment and find out if these similar effects and outcomes are possible on humans. Stark and Clemenson conducted a study in which they tested two separate groups of college students. The first group was told to play *Angry Birds* for thirty minutes a day for two weeks. The second group was told to play *Super Mario 3-D World* for the same amount of time. Both groups took memory tests before and after the two weeks. The results of these tests showed that the group that played the 3-D game improved by about 12 percent, while the 2-D group did not improve at all. It is possible that the reason video games can improve a wide variety of things is because they are not created with a sole purpose in mind, but instead they are able to immerse their players fully in a virtual world. In his research, Stark stated that, "It's quite

possible that by explicitly avoiding a narrow focus on a single cognitive domain and by more closely paralleling natural experience, immersive video games may be better suited to provide enriching experiences that translate into functional gains" (Vasich, 2015).

According to Oxford University researcher Dr. Vanessa Harrar, video games can be used to help sharpen one's skill for cross-sensory shift of attention (Ericson, 2014). What is cross-sensory shift of attention? It is the result of what happens when one's auditory senses trigger their attention and pull them away from focusing on their visual senses. An example of this would be if you were having a conversation with someone then hear your name being muttered somewhere behind you. Your attention would shift from the conversation with the person you are looking at to hearing more from the person who said your name. Some people who have dyslexia may suffer greatly from this. Dyslexia is typically referred to as being a disability that pertains to one's inability to read. Harrar explains the relationship between cross-sensory shift of attention and dyslexia by saying that, "People with dyslexia have difficulty focusing and refocusing their attention, likely causing them to move their eyes differently across a line of text" (Ericson, 2014). Therefore, it is hard for some people with dyslexia to focus in general, predominantly with reading, because they may not be able to keep their attention on one thing or shift quickly enough back to it if they have been distracted. Harrar adamantly believes that "Action-oriented video games featuring fast-paced sensory attention shifts would help dyslexics improve their cross-sensory skills and thereby promote higher reading comprehension" (Ericson, 2014). This could be the beginning of a whole slew of studies and

research into more ways of dealing with dyslexia and muffling its negative effects on focus and comprehension.

Another issue plaguing the public when it comes to comprehension and memory is old age. Age is one of the greatest threats we as humans have to our health, and it is a constant struggle. As we age, our bodies may become more fragile, our minds may become hazy, and our movements may be sluggish. A specific issue that old age may negatively impact is our ability to multitask. A team led by Dr. Joaquin A. Anguera and Dr. Adam Gazzaley from the University of California San Francisco, conducted a study where they assigned forty-six healthy adults aged sixty to eighty-five to one of three groups: multitask training using a 3-D video game, single-task training using a similar video game, or no video game training. The training consisted of participants using a joystick to keep a moving car in the center of a winding road while also adhering to the road signs. The test got progressively harder as the participants improved. The seniors who were tested played the video game for one hour, three days a week, for four weeks, for a grand total of twelve hours of gameplay. The seniors showed significant improvement to their multitask ability when tested at the end of the training period. They even achieved higher levels than that of a group of untrained twenty-year-olds and retained this level of improvement six months later when tested again: “The researchers found that the multitask training resulted in general improvements to cognitive abilities that are known to decline with age, particularly working memory and sustained attention” (Torgan, 2013). Video games help their players achieve a higher level of memory and comprehension,

and they are shown to aid in fighting disabilities and illnesses like dementia and dyslexia (Torgan, 2013).

Another cognitive benefit that video games offer is on the improvement of their players' mental capacity; video games have been found to strengthen their players' mental capacity. Now, most of the research into the impact of video games on humans has been negative. Video games have been blamed for causing depression, addiction, and aggression. However, Lisa Bowen referenced Isabela Granic in her research and suggested that "To understand the impact of video games on the children's and adolescents' development, a more balanced perspective is needed" (Bowen, 2014, as cited in Granic). This need for a more balanced perspective comes from the new wave of research that has been released during the past decade that points to a more productive and positive side to playing video games. The initial negative thought towards video games is that they cause laziness. Nevertheless, playing video games may have strengthening effects on such cognitive skills like spatial navigation, reasoning, memory, and perception.

Though some video games may be categorized as violent, it is typically only first-person shooter video games that have been shown to increase this trait the most in humans themselves. First-person shooters are games that require a person to navigate terrain and fight off enemies with varying levels of realism whilst seeing the environment through the characters eyes, hence the name of the genre. These games tend to be some of the most popular games ever released. First-person shooters are some of the most visually and mentally stimulating games out there due to the ever-changing surroundings and rapidness of the game play. Bowen

states that “Playing shooter video games improved a player’s capacity to think about objects in three dimensions just as well as academic courses designed to enhance these same skills” (Bowen, 2014).

Furthermore, the more that adolescents played games that required strategy or role-playing, the more their problem-solving skills and school grades increased the following year (Bowen, 2014). Action-based video games have greater lasting effects on their players’ mental processes, such as perception, attention, memory, and decision-making. The reason behind this is that action video games, are “games that require players to move rapidly, keep track of many items at once, hold a good deal of information in their mind at once, and make split-second decisions” (Gray, 2015). Gray talks of a study in which two strategies were implemented: correlational and experimental. In the correlational study, gamers were compared to non-gamers on some perceptual or cognitive test. The results of this test showed that the gamers outperformed the non-gamers every time (Gray, 2015). This method, though, has a flaw, because perhaps the selected gamers were just already smarter than their non-gamer counterparts. Therefore, the experimental method was employed. In the experimental method, a new group of participants was selected that was made purely of non-gamers. This group then had some participants play video games for a selected amount of time each day, while the others did not. After a short while, “In these experiments, the typical finding is that those who play the video game improve on measures of basic perceptual and cognitive abilities while those in the control group do not” (Gray, 2015). Video games improve the mental capacity of

their players. They can be used to strengthen mental capacity because of their action-packed visual stimulation, as well as the number of things the players must keep up with.

Video games are also being used to help aid in the rehabilitation process and have shown positive results in fighting off the side effects associated with the treatment of cancer. Patients often struggle with adhering to therapy, causing the rehabilitation process to be slowed and or less effective. Rehabilitation therapy can be time consuming and costly. However, a new method is offered in which video game play is used to improve the engagement with the patient's therapy. Video game play is suggested to be a relevant and cheaper method than traditional treatments, and "In rehabilitation settings, video games have been shown to have positive impacts on cognitive performance, motor performance, and affect. In quasi-experimental studies comparing video game experts with video game novices, experts show improved attentional capacity, expanded useful field of vision, and improved temporal resolution of attention relative to novices" (Shirzad, 2013).

Though most people see video games as a source of entertainment, more recently video games have been used to educate and train people. Specific serious games are designed for the use of training and learning, and these types of games are being used for that exact purpose. Some places are using commercial games repurposed to help meet certain behavioral goals in health care. A leading use for video games is to motivate patients. One way patients are motivated is through the act of play which is defined in depth by Rieber in "Video Games in Health Care: Closing the Gap" (Kato, 2010). Play is used as a form of stress management for patients who must undergo mundane or painful treatments. "Commercially available video

games have been shown to have therapeutic effects on side effects associated with the treatment of cancer. These side effects include nausea, vomiting, anxiety, and pain associated with chemotherapy or radiation treatments" (Kato, 2010). Commercial and tailormade video games are also seen to have benefits in helping with physical therapy and fitness, burn pain, asthma, diabetes, and pediatric cancer (Kato, 2010). Video games can effectively be used for treatments of negative side effects of cancer and use in rehabilitation.

Many organizations have turned to video games to train their employees, including in the military and the medical fields. For years now, businesses have been dabbling in the field of video game training for their employees without much evidence of their positive benefits. However, we can now prove the positive effects video games have when used in training employees: "Long derided as mere entertainment, new research now shows that organizations using video games to train employees end up with smarter, more motivated workers who learn more and forget less" ("Video Games," 2010). Traci Sitzmann, the assistant professor of management at the University of Colorado Denver Business School, spent over a year examining sixty-five studies and data from over six thousand trainees. Her findings show that those using video games had an 11 percent higher factual knowledge level and a 14 percent higher skill-based knowledge than those in the compared group ("Video Games," 2010). This research helps with the validity of businesses spending millions of dollars on developing video games for their employee training. Cold Stone Creamery lost money from workers over-serving scoops of ice cream, so they decided to develop a game that teaches their employees how to scoop the perfect amount every time. Miller Brewing Company created a game called Tips on

Tap, which teaches the bartenders how to pour the perfect amount of beer each time without having to touch the tap and contaminate it by having the player lose points if they touch the tap ("Video Games," 2010). The prominent organization that uses video games to train their employees is the military. The military is always trying to find new methods for recruiting and training their troops, and in recent years, that means they have started to investigate the use of video games.

The U.S. Military uses an arsenal of video games and simulators to help sharpen their fighting skills, as well as how to handle stress under combat. The game *America's Army* proved to be a more effective recruiting tool than all of the other advertisements combined (Hsu, 2010). The game was even made to be less bloody than the more mainstream *Modern Warfare 2* that came out around the same time so that it could have a Teen-rating, allowing kids as young as thirteen to play it. Gaming even shifted the way the army does basic training. They announced that "The recruitment of young gamers has forced some changes in military training. Earlier this year, the Army announced that it would reshape basic training to accommodate a new generation of tech-savvy recruits who may have more gaming skills than physical fitness" (Hsu, 2010). The simulators they use are so effective in training the recruits that many can go straight from them to the live-fire training, with little to no issues adjusting. There are simulators that also incorporate virtual reality in which a recruit can wear full gear and even throw mock grenades, as well as take shots from virtual enemies that emit a slight taser shock. The incorporation of video games in the business and military realms to instruct employees and recruits has been an effective new method and should continue to be explored.

The benefit of using video games for training is greatly demonstrated in the medical field. From learning new techniques to actual hands-on virtual reality work, video games are being used to improve healthcare. Justin Barad was tasked by the Los Angeles Zoo to operate on one of their gorillas, a difficult task for the doctor who was unfamiliar with surgical cases on animals. However, the surgery was a success. This prompted Barad to dedicate his career to making surgery training more efficient. He did this by using video games. He, along with a team of software and medical experts, founded Osso Virtual Reaity (VR). Though "Osso VR may not exactly be equivalent to plugging into the Matrix, but it allows surgeons to hone their skills by operating on virtual patients with tools they would normally find in an operating room. This lets trainees experience it first-hand without the fear of error" (Favis, 2020). Osso was such a success due to its 230 percent more effective training ability than that of traditional methods that it became a *Times* Best Invention of 2019. Many other virtual reality games have been created in the pursuit of better medical results. *Sea Hero Quest* was created to research the early signs of dementia, and *SnowWorld* was made to help burn victims deal with pain management (Favis, 2020).

Though virtual reality is perhaps the one with the most future potential, it is not the only use for video games in the medical field. There have been multiple studies into the use of video games to help with laparoscopic surgery. The first of these studies into laparoscopic surgery and video game correlation was done by Ohad Levi, who is the professor in surgery at the College of Veterinary Medicine. He conducted a study to investigate the effects playing video games had on basic laparoscopic skills. The study separated fifty-two college students

from the Western University of Health Sciences College of Veterinary Medicine and the Colorado State University College of Veterinary Medicine and mixed them up into two groups. Group L was to play eighteen hours of *Marble Mania* across a six-week period, while Group S was only to play three hours. Both groups were assessed afterwards by using MISTELS (McGill Inanimate System for Training and Evaluation of Laparoscopic Skills). The results of the study showed that both groups improved on the test about the same amount. This suggests that "playing *Marble Mania* on a Wii for any time duration could be an effective method for veterinary medicine students to improve basic laparoscopic skills and indicate the needs for additional studies" (Levi, 2018).

The second study began with the hypothesis that "there is a potential link between video game play and laparoscopic surgical skill and suturing" (Rosser, 2007). A study was conducted in which thirty-three residents and physicians participated, some of which had prior video game experience while the rest had none. The study was conducted with three different video game exercises that changed up the regiment of the players. The results show that across the board, there was approximately 30-40 percent less errors made, depending on the participants' specific regiment. The study concluded that "Video game skill correlates with laparoscopic surgical skills. Training curricula that include video games may help thin the technical interface between surgeons and screen-mediated applications, such as laparoscopic surgery" (Rosser, 2007).

The field of nursing has also delved into the use of video games for training their new students. Video games are used in the nursing field to explain complex information and to offer

an alternative to classroom training. Using customized games for the job, nurses are taught in a more fun way that still allows them to learn the skills required for their field. A game called *The World of Salus* was created so that "Instead of sitting through three days of classroom lectures, our new employees venture into a world where they create an avatar, earn badges, explore knowledge objects, compete on a leaderboard, and complete challenges to make it to finals and receive their certificate of completion" (Wojciechowski, 2018). The types of games used by the nurses at Mercy Medical Center evolved from simple trivia games to full blown adventure ones, all specifically created to supplement lectures and trainings (Wojciechowski, 2018). Video games can and have been used to effectively train students in the medical field. These video game training methods will lead to more understanding and less risk when learning than ever before in the medical field.

Video games are one of the greatest forms of entertainment out there, and they have been since their first installments. However, the time has come when video games are evolving out of only being a form of entertainment and into something much more. Video games are now being used in all sorts of ways and in all forms. The findings compiled in this research have demonstrated that video games can be greatly beneficial to one's mental, physical, and emotional health. This research was put together to show how certain preconceived views on fundamental matters, such as video games, can often be wrong. This research demonstrates the many benefits found from playing video games. Simply put, video games can be good for you, especially if used correctly. The goal is that through this research, more applications will

emerge that will incorporate video games with new methods to benefit fields of behavioral and physical sciences, as well as positively impact businesses and individuals across the world.

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