



How video games impact the skill of solving real world problems

Vikrant Thapliyal, MBA Student, Department of Management, College- Symbiosis Institute of Management Studies, Symbiosis International University, Pune

Dr. HIRAK DASGUPTA, Asst. Professor, Department of Management, College- Symbiosis Institute of Management Studies, Symbiosis International University, Pune

Abstract: Accompanying the wide-spread availability of performance systems (both computationally and graphically capable), academic research on video had expanded. While a significant portion of it has explored negatives aspects of video games, awareness of its positive applications and effects is not as expansive. A medium that has been around for 4 decades is now projected to take over cable entertainment in the coming period. Gaming has primarily been a form of entertainment but, this paper offers a literary analysis of existing research on feasibility of video games as an apparatus to develop skills used for solving real world problems.

Keywords: video games, solving real world problems, entertainment

I. INTRODUCTION:

Proportionate to the digitization age, the gaming industry has been growing at an exponential rate. In India, the gaming industry has grown by a whopping 27.06% yoy from Rs. 4 Billion (in 2007) to Rs 90 Billion (in 2020) and is projected to grow to Rs.

143 billion by the end of 2022. Overall around a third of the Indian population is a consumer of this media.

On the development side, games developers are pushing out intricately detailed worlds which encourage gamers to solve complex problems in these digital worlds which require significant brain usage. With ever increasing and cheaper computational power available to all, developers have built multi-dimensional and interactive worlds. Gamers are tasked to overcome these obstacles using calculated, tried and information based decision either alone or with team effort against bots or other players.

Owing to this engaging style of play behavior and the characteristics of the game itself, people are spending more time than before engaged in this virtual existence as they craft their own adventure; wherein lies the starting blocks of this study, players can experiment with different ways to tackle a problem without having to worry for real world repercussions for their actions. Hit and trial has been a fundamental way to form relations, set boundaries, all in all how we understand things.

While it is a public belief that playing video games means wasting hours at a stretch achieving nothing, on the other side decades of research shows that video games especially complex games like role playing games (RPGs), survival based games and simulation games have been shown to increase decision making speed, encourage teamwork, alleviate stress and improve motor skills, to state a few. Studies conducted by the Max Planck Institute for Human Development have shown that playing video games increase grey matter (a major component of the central nervous system). While it is commonly believed that gaming is an individual activity, a research conducted by the American Psychological Association challenges this belief. They reported that, in a 2011 study, that around 7 out of 10 gamers play either with a friend or match-make ally (a person) while participating in these massive virtual worlds.

With the on-set of the work-from-home routine since March 2020, the need for a mobile, laptop or desktop has increased. These devices contribute to 75% of all platforms where gaming happens. More people are drawn to gaming with data showing the same; a 45.16% jump in market value of the gaming industry in India alone.

Study on the use of gaming as a skill developing platform is limited with previous studies mostly focused on ill-effects of gaming or increasing player engagement, given the need to use this activity to develop real world applicable skills. It is important to note that this study is solely focused of video games as a vehicle for developing real world skills and not creating games specifically to address each and every skill.

II. LITERATURE REVIEW:

Video games are ever increasingly being used by psychologists to assist in their understanding of differences between individuals, developing motor capacity, and acquiring skills. Initial interest in this field of research can be traced back to 1980s when works by Metalis, Dorval and Pepin, Griffith, Gagnon were published to understand human cognition with the help of video games. The most systematic attempt to use video games for understanding human cognition was by Learning Strategies Programs. In this study, a game known as Space fortress was used and skills like attention, multi-tasking ability, memory, and hand eye coordination speeds were measure and analyzed. The game was used as a standard activity across multiple labs for performance comparisons. Its aim was to understand and deduce best methods to train complex motor actions, how activities affected each other in the game and how mastery of the game could be transferred to real world applications. The game lacked engaging narrative as the game difficulty did not adapt to the player learning the game as the gameplay was scripted in nature.

A 2012 study by Bavelier suggests that playing modern action games results in better cognitive and perceptual abilities. Two groups of people were tested and compared; one that played action video games (VGPs) and the other that did not play action video games (NVGPs). VGPs demonstrated increased exploitation of task relevant information while discarding irrelevant information efficiently compared to NVGPs, but not all skills could be transferred to real world applications consistently. It states that learning to learn does not make sure that all performance of an individual increases. It further states that real world tasks that shared structures with their virtual-counter parts had improved knowledge produced same could not be concluded for real tasks that did not share any structure with the video games. It talks about potential drawbacks such as increase in resources may lead to the user over exploring the models, to test more than the task requires to be performed. It concludes by saying that while VGPs do not excel at all tasks compared to NVGPs, VGP's have more of a framework to work off and perform tasks.

Another study of December 2004 attempts to study how games affect cognitive neuro function. It asserts that improvement in motor skills of players can be associated to heredity also and not only gameplay. Some subjects may naturally have better hand-eye coordination than other subjects. Hence for a true study random selection of subjects is paramount. Again 2 groups were formed, one that played for 15 minute on the Atari 2600 machine and the other that did not. Reaction tests concluded that gamers tended to have slower reaction time than non-gamers, around 50ms on average. Similar results were obtained when the same test was conducted on children. Dorval and Pepin's 1986 study focuses on spatial skills. They used a 3D game known as Zaxxon. In Zaxxon, the player's objective is to hit enemies while prevent themselves from getting hit by incoming projectiles. Subjects went through 8 sessions of playing. Later when when spatial scores were compared the gaming group showed improved spatial scores compared to the non- gaming group. Similar tests were conducted on children where class 5th children who had training on the Atari 2600 had better scores than class 9th children who had no training. This suggests that video games do have a positive impact on cognitive abilities of players.

The US armed forced has also researched into video games being used for PTSD treatment. In a 2018 study studies into how video games and certain elements of it can be used to treat veterans who have had traumatic experience and help them move on. Massively Multiplayer Online elements combined with Virtual Reality and custom variables suited to the veteran can help them overcome their PTSDs. It concludes with suggesting standard terminologies, protocols and ethical investigative practices for creating such a complex model.

III. DATA ANALYSIS AND INTERPRETATION:

a) How video games may affect the brain:

Cognitive neuroscientists are interested in perceptual impact as well as neural factors that affect learning. A 1998 UK study was focused on neurological impact of video games. They measured the amount of dopamine (which is a neurotransmitter that enables transfer of information from one part of the brain to the other) released by the subjects while playing action games. Using PET form of brain imaging they found that the dopamine levels were elevated in the subjects during play especially in the reward and learning parts of the brain. The increase in levels was similar to those when amphetamines are injected in the body. Why and what purpose do the increased levels serve is unknown but a study conducted on rats suggests that it helps in changing the brain after a learning activity. Bao conducted a research where he subjected rats to 9 kHz sound (tuned to their tone building part of brain) and mapped

it to the rats' dopamine levels. After 17 iterations it was observed that the tone part of their brains has expanded due to increased dopamine. Parallels could be drawn between the rats hearing the sound and humans playing video games which results in faster learning. It is suggested that these increased levels could result in faster and more complete learning ability in humans.

b) How video games have an impact on visual attention:

Visual attention can be described as the mechanism by virtue of which we select and process parts of the visual information that we receive and reject the rest. Greenfield in 1994 studied that impact of video games on divide and switch ability of a person. They conducted a reaction test in which subjects were asked to hit a button as soon as they saw a flashing target. The flash could only happen in one of two points, point A and point B. The test was configured to flash both points in 10% of the cases, in point A 80% of the cases and in point B 10% of the cases. This was done to find out if the subject would demonstrate a location bias. The study concluded that location A had less average reaction time compared to location B confirming the existence of a location bias. Later they conducted the same test on two groups of subject, one group consisting of expert video game players and the other having non gamers. Gamers were shown to have less average reaction time compared to non-gamers and it was hypothesized that gamers would be better able to identify objects at the periphery.

c) Impact on cognition and perception:

Greenfield in 1984 had emphasized that many aspects of video games could be used for interesting study topics. Later studies of 1980s and 1990s did confirm this and stated that even seemingly simple video games could have huge changes in behavior. Later when Greenfield conducted a research using the game Pac-Man, she found that people were, to a great extent, able to recognize enemy patterns and develop strategies to play the game. This raised the idea that video games may be utilized for developing motor and spatial skills. This idea was later explored in depth and confirmed in the second half of the 1980s.

IV. FINDINGS:

a) Video games as a means for elderly rehabilitation:

Although studies suggest that video games can have a positive impact, most of the population can function well without these entities. However, as populace ages and neurons degrade, the elderly start suffering from deficits like short term memory, loss of memory, decrease reaction time and reduced hand-eye coordination as concluded by Drew and Waters in 1986. This raises the question whether these damage can be reversed to some extent. Drew and Waters studied a group of 13 individuals of age 61-78. They had them play Atari 2600 for one hour every day for two months. The group was reported to have improved hand-eye coordination and their intelligence scores had increased. Hence it can be said that playing video games can improve cognition for the elderly but specifically which aspects of games impact them that most requires more research.

b) Video games to assist children:

Humans' cognitive, perceptual and motor skills are developed during their infancy to adolescence. Experts suggest that most development happens between the age of 2 to

4 years old. Hence this time frame becomes a crucial period for providing children with tools to maximize their growth. Dubar implied that children's attention skill later forms their behavior as pedestrians. Later in 2001 Dubar, Hill and Lewis studied children of varying age groups to test their attention and focus. They observed that children who had played video games depicting more attention and awareness while crossing roads compared to those who did not play video games. Although this field

of study requires more exploration, it can be taken that children may have the same benefits from video games as adults do.

c) Video games to train military personnel:

Military is a profession that can benefit the most from improvement in cognitive ability and spatial awareness and this improvement may often be the difference between life and death. Studies of 1982 and 1984 have shown Atari game Air Combat Maneuver as a useful tool for training pilots. It also suggests that radar operators as well as sonar operators could benefit from this style of training. Similar results came from Israel when Gopher, Weil and Baraket in 1994 test air cadets and found increased efficiency in their ability to function under high pressure. Not only pilots but these kind of improves would be beneficial to other branches of military as well.

V. CONCLUSION:

Video games are a huge part of the modern culture with 44% of the world taking pleasure in it. Existing knowledge and data suggests that playing games results in improved motor skills, reaction times, spatial awareness and hand-eye coordination to state a few. With modern games being rendered in 3 dimension, mentally working in 3D can also be added as a skill being affected by games. Other aspects like visual attention, split attention and recognizing peripheral objects (a skill that can be using spotting kids when driving) have also been shown to be enhanced by video games. That fact the games can be used as an apparatus to enhance learning and improve our brain's performance may suggest that gaming may become a tool in the near future.

REFERENCES:

- 1) Winston, A. July 16 2020. Infographic: Mobile game market trends 202
- 2) Statista. September 202. Value of the gaming industry in India from financial year 2007 to 2020, with estimates until 2022
- 3) Isabela Granic, PhD, Adam Lobel, PhD, and Rutger C.M.E. Engels, PhD. October 2013. The Benefits of Playing Video Games
- 4) The university of Arizona. 2020. Game changer: Video Games and Real-World Problem Solving, Part One.
- 5) Brooke, D. February 20, 2020. How video games help solve real-world problems faster
- 6) Griffith, J. L., Voloschin, P., Gibb, G. D., and Bailey, J. R. 1983. Differences in eye-hand motor coordination of video-game users and non-users.
- 7) Gagnon, D. 1985. Videogames and spatial skills: an exploratory study.
- 8) Metalis, S. A. 1985. Effects of massed versus distributed practice on acquisition of video game skill.
- 9) Dorval, M., and Pepin, M. 1986. Effect of playing a video game on a measure of spatial visualization.
- 10) Donchin, E., Fabiani, M., and Sanders, A. (eds.). 1989. The learning strategies program: an examination of the strategies in skill acquisition
- 11) Bavelier, D., Green, C. S., Schrater, P., and Pouget, A. 2012. Brain plasticity through the life span: learning to learn and action video games.
- 12) Carras C. Michelle, Kvedar J, Labrique A, Carabas Y. January 22, 2018. Commercial Video Games As Therapy: A New Research Agenda to Unlock the Potential of a Global Pastime.
- 13) Koepp M, Gunn R N, Lawrence A, Cunningham V. June 1998. Evidence for striatal dopamine release during a video game.
- 14) Bao S, Chan V T, Merzenich M M. July 5, 2001. Cortical remodelling induced by activity of ventral tegmental dopamine neurons.
- 15) Greenfield M, DeWinstanley P, Kilpatrick H, Kaye D. January 1994. Action video games on informal education: Effects on strategies for dividing visual attention.
- 16) Greenfield P. January 1984. A theory of the teacher in the learning activities of everyday life.
- 17) Lowery B, Knirk F. December 1 1982. Microcomputer video games and spatial visualization acquisition.
- 18) Metalis S. October 1 1985. Effects of Massed versus Distributed Practice on Acquisition of Video Game Skill
- 19) Drew B, Waters J. 1986. Video games: Utilization of a novel strategy to improve perceptual motor skills and cognitive functioning in the non-institutionalized elderly
- 20) McClurg P, Chaille C. 1987. Computer games: Environments for developing spatial cognition?
- 21) Clark J E, Lanphear A K, Riddick C C. 1987. The effects of videogame playing on the response selection processing of elderly adults

- 22) Orosy-Fildes C, Allan R W. 1989. Psychology of computer use: XII. Videogame play: Human reaction time to visual stimuli.
- 23) Whitcomb G R. 1990. Computer games for the elderly.
- 24) Gopher D, Well M, Tal Bareket. September 1 1984. Transfer of Skill from a Computer Game Trainer to Flight.