

How Is Emerging AI and Game Development Applied in Tennis, Kinesiology and Sports Science?

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ABSTRACT

As a result of modern technological advancements, artificial intelligence and game development have been wired to adapt to its plethora of applications in sports science. The integration of new technological tools with kinesiology has opened up new areas of research in sports science by establishing new games that can provide immersive experiences for players to bolster their creativity, cognitive mind and reap academic benefits, especially for those with cognitive disabilities.

Introduction

This brief review will specifically examine the applications of game-sense approach, review relevant research findings entailing tennis training models, and their subsequent positive impact on the cognitive development of the brain. Furthermore, this publication will look into potential limitations and areas of research that could be delved into in the future to better bolster innovative research that is conducted on the intersections of game development and sports science.

Defining Game Sense Approach

As sports science continues to evolve, the game sense approach has become defined as a strategy that enables sport teachers to adopt a particular strategy to enhance the collective decision-making of tennis players, as a result of establishing appropriate dynamics of configurations that are based on personal coordination and dynamics. Recent research has bolstered emerging data that game-based play encourages players to enhance their decision-making, personal coordination and skill acquisition in an amplified manner — something that mirrors the developmental stages and behaviors of health and physician education students that are perceived as “high-achievers” in the curriculum. (Hewitt et. al., 2018) Through engaging athletes and youth in modified game strategies and concepts, research predicts that there would be a heightened understanding, skills and tactics as a student-centered approach.

Effect of Game-Based Tennis Training Model on Acquiring Tennis Skills

Game-based tennis has been established as an appropriate model to enhance tennis players with their forehand drive skills. Specifically, research has come to demonstrate how through developing technical, tactical and psychological attributes, tennis players can control the factors of performance required for success. Researchers have bolstered the idea that games provide a safe place for players to interact through social interactions like competition, cooperation and negotiation. (Fauzi et al., 2021)

When a study was conducted on 44 individuals from two groups, from having users interact in a game-based mini tennis, findings demonstrated that the result subsequently showcased improved tennis skills, increased value of

cooperation, confidence, and competition, as predicted. Results from this particular study demonstrated that with 22 control subjects and a mean of 18.09 (calculating the forehand drive skills), the score improved to a 22.95 (upon playing tennis and improving skills) This comes to reiterate the idea that game-based mini tennis exercise models can enhance forehand strokes and other soft values in children aged 6-8 years old. Implications of this research point to the ideology that it is crucial for tennis athletes who are 6-8 years of age to pursue training models that emphasize fun but contain an element of learning to facilitate better learning outcomes.

Modern Tennis Teaching Approaches

Modern tennis coaches lean towards very similar principles in terms of teaching skills, though executed in various methods. Whether each coach focused on lecture, action, or analysis, the game of tennis is most commonly taught through concepts of learning ways of greeting obstacles and challenges in strategy and physique, high amounts of not only fed balls but also live ball play, and examining mistakes of players through video records. An interview from Baltic Journal also showed that 13 out of 13 coaches expressed their methods to be a “Game-Based Approach” where players are encouraged to find and fix each problem they encounter themselves (Baltic Journal). The modern coaching methods work to promote critical thinking for players, which tends to have a longer lasting effect than temporarily solving issues, helps players develop independent learning habits, and boosts players’ self-esteem, motivating them to discover more around their passion towards the sport.

Challenges that tennis coaches face in terms of training each individual player include not only what is seen within the game itself, but also always shifting conditions of court surfaces, wind levels which affect ball pace, ball types along with player psychological and physical statuses. All these roadblocks show how ineffective traditional teaching methods would be, calling for a custom approach developed specific to improving in this sport to aid both players and mentors to understand each dynamic of the game to a higher level. Training and competition models became designed to reach four fundamentals: applicability of content from training, knowledge/understanding of the game, values that set principles of the process of training, and management in operating the set principles.

Games’ Impact on Enhancing the Neural Network of the Brain

In the same way the pursuit of tennis and training hours and performance depend on an optimal and inclusive environment, efficient coaches and resources to bolster one’s athletic skills, games also depend on an appropriate environment where youth are able to acquire certain tactics and athletic qualities that benefit them in the long-run. Scientific research conducted to date has highlighted the efficiency of optimal video games that can enhance cognitive abilities and human behavior of youth. With these video games now being renamed as “brain games”, more and more innovative findings have highlighted the positive lasting impact games can have on human cognitive skills.

For instance, playing video games can positively alter the brain of adolescents, with increased improvements in cognitive functions, that are seen in the radical increase in grey matter within the prefrontal cortex. When an analysis was conducted through magnetic resonance imaging scans of 152 14-year-old adolescents, cortical thickness of the brain was evident, during the duration of video gaming. Additionally, no regions showed cortical thinning while the participants were engaging with their video games.

Training with video games has also been predicted to enhance cognitive functions, in addition to perpetual functions in both young and older individuals. As video games are inexpensive, and a fun form of activity, occasional video game players reported higher levels of well-being, enhanced cognitive performance and brain health. With regards to its specific impact on the brain and its structure, when a control group that had exposure to video gaming training was compared to a test group, researchers uncovered that there was a significant gray matter (GM) increase in the right hippocampal formation, right dorsolateral prefrontal cortex (DLPFC), and bilateral cerebellum in the training group. Thus, pointing to the proposition that video game training could also be used to counteract known risk

factors that lead to mental health illnesses like smaller hippocampus and prefrontal cortex that are prevalent in patients diagnosed with post-traumatic stress disorder, schizophrenia and neurodegenerative diseases.

Discussion: Contradictory Analysis of Games and their Efficacy

Recent studies have uncovered the complexities of video games and their subsequent psychological impact — specifically by reviewing 10 varying genres of action-based games that have varying strategies and tactics. By reviewing action games like Call of Duty or Gears of War, emerging research has highlighted how action games can enhance a player’s attention span — specifically, in the ways in which their mental processes retain relevant information when players adjust to a shift in their pivotal mental focuses and responses. For instance, through the act of fighting off zombies, or targeting certain players, psychological tests and brain scans showed evidence of the positive implications of action games — in leading to a heightened activity within the dorsolateral prefrontal cortex, which leads to increased attention span.

An arguable proposition based on this opens door to emerging and subsequent research on how the positive impact of technological games mirrors that of pursuing tennis – by extending its processing results, memory retention and inclined attention span.

Experiments regarding people playing the action genre of video games exhibited an increase of 10% in reaction times compared to their performances before picking up games. Specifically, these types of games may enhance a player’s ability to be comfortable in making the correct decisions under pressure and improve focus in small visual details. As a matter of fact, studies show that the improved cognition skills gained from video games allow game-playing surgeons to work not only faster, but more efficiently at their jobs.

Arguably speaking, building the necessary foundations for optimal brain-boosting games also requires a technical analysis of reviewing data and applications of games on individuals with varying neurodivergent conditions. For instance, when research was conducted on adults who possess attention deficits, or those formerly diagnosed with amblyopia, the notable results highlighted above regarding the positive paradigm shifts on the brain above were not evident— thus, highlighting the need for research to diversify their game applications, and tailor their technology to be compatible with individuals who have various conditions like dyslexia, ADHD, and many more.

Conclusion

The prominence of the positive benefits tennis can bring to the human brain, motor skills and coordination also mirrors the benefits derived from playing action-based video games. With its subsequent impact on the cognitive processing of the human brain, researchers have been delving into optimal games and platforms that can uniquely cultivate immersive experiences for aspiring athletes to attain the basic fundamentals, motor work and skills that could help enhance their athletic performance. By connecting new game development platforms with tennis, and bridging these technological gaps, more games can be constructed by game developers in pursuit of continuously rewiring new solutions for athletes and kinesiologists.

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