Proceedings of the 5th International Conference on Education Innovation and Philosophical Inquiries
DOI: 10.54254/2753-7048/52/20241555

VR in Soccer Training

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Abstract: Nowadays virtual reality (VR) technology has been applied to many aspects of soccer training, and corresponding studies have been conducted in technical skills, cognitive psychology, tactical ability, and, sports rehabilitation. This paper explores the impact of VR on soccer training by reviewing a large amount of literature and integrating, summarizing, and concluding it. It has been found that VR has a significant effect on improving the technical skills, cognitive psychology, tactical ability, and sports rehabilitation of soccer players. For enhancing sports performance in the real world, VR technology has great potential for development in the future. However, it remains to be seen whether VR will be widely used by athletes, coaches, and sports organizations. With the current state of development, the functionality of VR systems will become more and more powerful in the future, as well as less costly, providing a more convenient channel for its application and popularization in soccer. Although the scientific evidence to prove its effectiveness is still weak, the practice of VR and soccer training innovations will occur more frequently and be more closely integrated with other advanced technologies, so that future research on this topic will be richer, deeper, and more comprehensive.

Keywords: VR technology, soccer training, sports performance

1. Introduction

As the world's number one sport, soccer has had a far-reaching international influence since its birth and development. The immeasurable commercial value, the huge and meticulous tournament system, and the scientific and systematic training method have developed and expanded rapidly. Nowadays, soccer is not only a competition between countries in the field of sports but also a competition between economic, cultural, and scientific fields. Therefore, sociology, sports science, psychology, physiology, and other aspects of people have never stopped on soccer research, especially for soccer training this important link, the training method of updating and modernizing also promotes the corresponding training technology and equipment generation and innovation. For example, the use of an isokinetic muscle strength testing system (CYBEX-NORM) in the dynamic assessment of muscle function in soccer players [1]. As well as the metabolomics approach of liquid chromatography-mass spectrometry (LC-MS) in exploring changes in the regulation of energy metabolism in soccer players before and after training and competition [2]. Today, with the rapid development of virtual reality technology VR, some experts and scholars have also applied it to soccer training through research.

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Today VR can be applied to numerous aspects of soccer training, contributing to technical skills, tactical strategies, sports rehabilitation, and cognitive-psychological aspects to varying degrees. These include improving team dynamics, refining individual skills, and minimizing injury risk through prevention and rehabilitation models [3]. These technologies are invaluable training tools for strategy refinement, tactical development, and real-time response practice in a tightly controlled environment. As it stands, VR systems and their accessories are becoming more powerful but also cheaper, which may accelerate their practical application. Despite the largely weak scientific evidence for its effectiveness so far, its unique solution, high modifiability, and creative development potential can still be considered a promising sports training tool for the future. In the future, VR for enhancing sports performance in the real world has great potential.

2. Overview of VR Technology

Since its inception in the 1960s, virtual reality (VR) technology has been used in a wide range of fields. It encompasses various technological disciplines, including image, multimedia, and simulation technologies. VR technology is made up of mutual alterations between virtual and physical things as well as computer processing. Numerous technological techniques, including spatial tracking, model building, sound localization, and others, are used in VR technology. By combining many different technologies and approaches, virtual reality technology may demonstrate its exceptional benefits. VR technology primarily manifests itself in three ways: immersion, rich imagination, and human-computer interaction. Immersion refers to the ability of any kind of computer to create a virtual environment using VR technology. Users that participate in the virtual world can receive corresponding feedback thanks to human-computer interaction. VR technology can provide participating users with sufficient imaginative environment and space through effective simulation of the natural world [4]. Therefore, the application of VR technology in classroom teaching can enrich the teaching means of teachers, create a virtual environment for students, mobilize students' enthusiasm, give full play to students' imagination, improve learning efficiency, and reduce the teaching intensity of teachers. It can also bring visual, auditory, and tactile multi-sensory to students participating in the classroom and improve their learning experience.

3. Application of VR Technology in Soccer

Virtual Reality (VR) has revolutionized soccer training, offering an immersive and realistic simulated experience that can significantly enhance players' skills and performance. By utilizing VR headsets and 3D near-eye displays, trainers can create a vividly lifelike virtual training scenario that replicates the feel of a real soccer field, including the goal, ball, grass, surrounding trees and sky, and even the atmosphere of the fans.

One of the key benefits of VR in soccer training is its ability to "migrate" potential training effects from the virtual world to the real world. This means that players can practice and refine their motor skills in a safe and controlled environment, which then translates into improved performance on the actual soccer field. A controlled study conducted with male athletes from Yogyakarta State University (Indonesia) demonstrated that VR training significantly improved the level of sports participation and technical skills, highlighting the power of this technology to enhance player development.

In addition to improving motor skills, VR also facilitates the mastery of technical movement essentials and soccer skills. The ability to create complex and repeatable training tasks within a fully controlled environment means that players can safely practice difficult moves and techniques until they are perfected. This not only enhances their technical proficiency but also builds confidence and familiarity with various game scenarios.

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From a cognitive psychology perspective, VR training can be particularly beneficial for youth and inexperienced players. By simulating real game scenarios, including stressful situations, VR helps players to better cope with the pressure and demands of actual soccer matches. It can improve their decision-making ability during training and matches by enhancing their visual search behavior (VSB) and inhibitory control. This means that players become more adept at scanning the field, identifying opportunities, and making split-second decisions under pressure. Overall, VR represents a powerful tool for soccer training, offering a comprehensive and immersive approach that can significantly enhance players' skills, performance, and confidence. As technology continues to advance, the potential applications of VR in soccer training are likely to expand even further, providing new opportunities for player development and performance improvement.

4. Discussion

The importance of VR training in soccer cannot be overstated. Its potential to enhance athletes' motor and psychological skills and abilities is profound, particularly in areas such as perceptual-operational skills, strategy, tactics, decision-making, and responding to contingencies. The ability to simulate real-world scenarios in a safe and controlled environment allows players to practice and refine their skills without the risks associated with physical training.

VR has proven its worth in soccer training, delivering significant results in technical skills, cognitive psychology, tactical training, and motor rehabilitation. It provides a solid foundation and guidance for future applications of this technology in soccer training, offering new opportunities for player development and performance improvement.

The integration of VR with other technologies such as artificial intelligence (AI), augmented reality (AR), and data visualization (DV) further enhances its potential in sports training. This combination of technologies can maximize the role of VR in improving soccer players' performance, providing them with a comprehensive and immersive training experience.

Moreover, the availability of advanced software such as Poser 8.0, 3ds MAX, and EON Studio supports the development and research of virtual soccer sports system software. These tools allow for the creation of undisturbed virtual systems that are not affected by external natural conditions, breaking through the limitations of weather and enabling effective sports training regardless of environmental factors.

In conclusion, VR represents a transformative tool in soccer training, revolutionizing the way players develop and enhance their skills. As technology continues to evolve, the future of VR in soccer training looks bright, with endless possibilities for player improvement and performance optimization.

5. Conclusion

VR can transform the ability gained in the virtual world to the real world, and improve the technical skills, cognitive psychology, and tactical ability of soccer players, in addition to promoting the rehabilitation of athletes with injuries and diseases, which can be seen in the wide range of the use of VR technology in soccer training, and the effect of the feedback is obvious.

Virtual reality (VR) appears to be a potential technology for sports training in the future, especially considering its current state of development and study. It remains to be seen, that the application of VR technology in soccer training is a relatively new way of training, and the enhancement of athletic performance in the real world has great potential in the future. though, coaches, sports organisations, and individual players will make extensive use of virtual reality. While VR systems and their accessories continue to grow in power, they are also growing more sophisticated, but also cheaper, which may accelerate the process of their practical application.

Although the scientific evidence that can prove its effectiveness is so far insufficient, the high degree of modifiability of unique solutions and the potential for creative development can be used as a supporting argument for investing in VR systems. In the future, innovative practices will occur more frequently. This is due to the high degree of freedom that VR offers to creators and the fact that research on this topic will be richer, deeper, and more comprehensive in the future.

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