

Research on the Application of Virtual Reality Technology and Platform Construction in University Track and Field Teaching Effectiveness

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Abstract: With the advancement of technology, virtual reality (VR) technology is increasingly being applied in the field of education, especially in higher education. The application of VR technology is not limited to theoretical courses but has also expanded into the field of physical education. This paper explores the construction model of a virtual reality teaching platform for track and field sports in colleges and universities. By employing a literature review method and utilizing virtual reality technology in conjunction with track and field training knowledge, it provides students with a more immersive learning experience. By simulating real-life scenarios, VR technology enhances the learning experience and outcomes for students. It can compensate for some limitations of traditional physical education models, offering an immersive training environment and avoiding safety risks associated with actual sports activities. This innovative teaching method brings new possibilities to college track and field education. It is expected to play a significant role in future physical education.

Keywords: Athletics; VR; Teaching; Platform Construction; Teaching Effectiveness

1. Introduction

With the rapid development of modern science and technology, the field of education has ushered in a new era of online education. Virtual reality technology, as an emerging teaching medium, is gradually becoming widespread and plays an important role in physical education. VR technology creates immersive learning environments that allow

students to learn as if they were there, thereby increasing interest in learning, stimulating creativity, and enhancing memory. Moreover, VR technology can compensate for deficiencies in traditional physical education and training, such as time, space, safety, and funding.

In traditional models, college track and field teaching faces many challenges. For example, due to limited sports facilities and high equipment costs, many schools struggle to meet the needs of track and field instruction; track and field sports have a certain level of danger, and traditional classroom training is more prone to accidental injuries; the traditional teaching model is teacher-centered, leaving students in a passive state, lacking initiative and enthusiasm; there is a significant gap between theoretical knowledge and practical operations, making it difficult for students to apply what they have learned to actual training; in response to the drawbacks of traditional teaching models, VR technology has shown great potential in college track and field teaching. By 3D reconstructing real track and field environments, VR technology can provide students with a safe and controllable virtual training platform, avoiding safety risks in actual training. With VR technology, teachers can develop personalized training plans based on the specific circumstances of each student, helping them improve their skills purposely. VR technology also provides an immersive learning experience, allowing students to fully engage in training within a virtual environment, thereby enhancing interest and effectiveness in learning. By simulating real competition scenarios, VR technology can help students better understand and master the principles and strategies of track and field sports, thus achieving effective

knowledge transfer. By combining theoretical teaching with virtual practice, VR technology can significantly improve the quality and effectiveness of track and field instruction.

In conclusion, the application of virtual reality technology in the field of education not only changes traditional teaching models but also provides new solutions for college track and field teaching. By optimizing the teaching environment, enhancing the learning experience, and improving teaching quality, VR technology is expected to change the current state of college track and field instruction, bringing students a more direct and effective learning experience. In the future, with continuous technological advancements and deeper applications, VR technology will play an even greater role in the field of education, promoting the development of educational modernization.

2. The Application of VR Technology in College Track and Field Teaching

2.1 Overview of VR Technology

Virtual Reality (VR) technology is a high-tech method for creating and experiencing virtual worlds through computer systems. This technology can generate various virtual environments that affect users' senses of sight, sound, touch, and more, making them feel as if they are truly immersed in the experience. VR technology has existed since the 1970s, and its development has evolved from early mechanical tracking head-mounted displays (HMDs) to the current wireless HMDs, which are driven by regular PCs and graphics cards. Many so-called VR applications do not even use HMDs. VR technology is widely applied in various fields, such as science, engineering, military, medicine, entertainment, and social networking. With continuous technological advancements, VR technology has gradually moved from its initial use in gaming and entertainment into other areas, including education and sports training[1].

In the field of education, the application of VR technology is mainly reflected in providing immersive learning experiences, enhancing learning motivation, and knowledge retention. Moreover, VR technology can improve the interactivity and situational aspects of learning by simulating real-world environments or objects. Despite the broad prospects for VR

technology in education, its widespread adoption still faces challenges such as high costs and the inconvenience of equipment[2]. In the field of sports training, VR technology also demonstrates its unique value. It can simulate complex sports scenarios, breaking through traditional sports teaching limitations in terms of space, equipment, and safety[3]. With VR technology, athletes can train without physical constraints, thereby improving their technical skills and training quality[4]. Additionally, VR technology can provide scientifically accurate guidance to help athletes gain more technical knowledge[5]. However, due to factors such as technological maturity and equipment costs, the application of VR technology in sports training has not yet been widely adopted.

The application of VR technology in education and sports training shows great potential and value. It not only provides immersive learning and training experiences but also breaks through the limitations of traditional teaching and training, enhancing the efficiency and effectiveness of learning and training. However, to achieve widespread application of VR technology in these areas, there are still technological and economic issues to be addressed, such as costs and equipment portability.

2.2 Characteristics of VR Technology

2.2.1 Multimodal input experience

The multimodal input experience of VR technology allows users to interact deeply with the virtual world using a variety of senses and input methods within the virtual environment, thus creating a richer, more three-dimensional, and realistic perception experience. The multimodal input of VR technology not only enhances the user's sense of immersion but also shows significant effects in skill and knowledge transfer. In track and field teaching, VR technology breaks through the limitations of traditional on-site training, allowing students to experience more realistic training scenarios in a virtual environment. Through sensory stimulation such as vision and hearing, as well as repeated simulation of complex scenarios, it improves teaching efficiency and fun, effectively promoting the transfer of skills and knowledge.

2.2.2 Highly immersive experience

VR technology offers a comprehensive,

extensive, immersive, and vivid illusion of a virtual environment, combining body-matching and self-contained narratives, and enhancing realism, engagement, and motivation. This allows users to experience a sense of presence through visual, auditory, and tactile perceptions, achieving a highly immersive experience. By creating a highly immersive virtual environment, VR technology enables students to train as if they were on a real track field. With high-resolution visuals, surround sound, and realistic physical feedback, VR provides a training space that is close to reality, allowing students to focus on skill and tactical training. This improves their concentration and engagement, making the learning process more enjoyable and efficient.

2.2.3 Real-time interaction with no delay

With the development of 5G networks, which support high throughput, low latency, and reliable communication, they provide an ideal network environment for VR applications. VR technology has made significant progress in real-time interaction, especially in terms of low latency and high reliability communication requirements. VR technology requires the system to respond in real-time to various inputs to provide an immersive experience. The real-time interaction feature of VR technology ensures that students' operations in the virtual environment receive immediate feedback, which is crucial for correcting erroneous movements and optimizing technical details. Students can view their motion parameters in real-time through the VR platform and adjust their training plans accordingly. Teachers can also remotely monitor students' training situations and provide guidance and suggestions in a timely manner, achieving personalized teaching and precise training.

2.2.4 Sensory immersive experience

Virtual Reality (VR) technology creates a computer-generated world that makes users feel as if they are truly inside it. This experience is not just visual; it encompasses a comprehensive use of multiple senses including touch and hearing to achieve a high degree of immersion. Beyond the traditional five senses, VR also explores the possibility of enhancing the user experience by synthesizing perceptual patterns. For example, by combining visual and tactile stimuli, new perceptual experiences can be created, such as

pseudo-haptic effects and the sensation of self-motion. This approach not only enhances the user's immersion but can also alter their perception. In track and field sports, students can experience running, jumping, and throwing within a virtual environment, and this immersive experience can increase their interest and engagement in learning.

2.2.5 The impact of emotions and agency on presence

VR technology can elicit strong emotional responses closely related to the user's "sense of presence," which refers to the subjective experience of feeling oneself in a real place within the VR environment. Studies have shown that emotional states are influenced not only by VR content but also affect the user's sense of presence, for example, interacting with virtual environments that induce "anxiety" and "relaxation" can respectively produce feelings of anxiety and relaxation. Additionally, individual personality traits can moderate the relationship between emotions and presence, for instance, individuals with high cooperativeness and self-transcendence experience a greater sense of presence in VR, which further enhances their cognitive anxiety levels. Moreover, agency is also a significant factor influencing presence, which refers to the user's sense of control over their actions in the VR environment; when users feel they can control events within the VR environment, their sense of presence is heightened.

Through evoking emotional resonance and agency experiences, VR technology enhances the user's sense of presence and belonging. In track and field instruction, the impact of these emotional and agency influences can help students better immerse themselves in the training scenarios, increasing their passion for and identification with track and field sports. By simulating real competition scenes and team atmospheres, VR technology can stimulate students' competitive spirit and team spirit, promoting communication and cooperation among them.

2.2.6 Personalized interactivity

VR technology enhances engagement and satisfaction by adjusting interaction methods to fit the user's physical and psychological characteristics. The multimodal interaction of VR systems, which integrates visual, auditory, and other sensory information, creates a unified perceptual world that enhances the

user's personalized experience. With the advancement of technology, the continuous progress in VR devices such as Head-Mounted Displays (HMDs) and spatial audio systems has made it possible to achieve a higher level of immersion and personalized interaction. VR technology allows teachers to create personalized training programs based on student needs, and students can independently choose their training content, thus achieving personalized learning.

In summary, the characteristics of VR technology, including multimodal input experience, highly immersive experience, real-time interaction without delay, sensory immersive experience, emotional and agency influence on presence, and personalized interactivity, provide new solutions for track and field teaching, improve learning outcomes, break the limitations of traditional teaching, and inject new vitality.

3. Advantages of Building a VR Teaching Platform for University Athletics

3.1 Improve Learning Efficiency and Interest

VR technology creates engaging virtual environments that provide students with rich visual and sensory experiences. Students can practice in this safe and highly interactive learning environment, which is more stimulating and motivating than traditional face-to-face teaching[3]. For example, VR can simulate competitive environments for various sports like long-distance running, sprinting, and long jumping, allowing students to experience the sports process firsthand in a virtual setting. This enhances the appeal of learning and sparks curiosity and a desire to explore, making students more actively involved in the learning process. Increased engagement helps students learn track and field knowledge and skills more quickly, thereby improving learning efficiency.

3.2 Break Through the Limits of Traditional Teaching.

3.2.1 Venue restrictions

Traditional track and field training is often constrained by physical space, especially in urban or space-limited environments. VR technology can simulate highly complex sports environments, allowing students to train

without the need for actual venues. This technology can simulate various track and field scenarios, such as running tracks, long jump pits, etc., overcoming physical space limitations and enabling students to experience a variety of competitive environments, thereby enhancing their ability to adapt to different competition conditions[3].

3.2.2 Device limitations

High-quality athletic training requires specific equipment, such as treadmills, javelins, and shot puts. These devices are not only expensive but also take up a lot of space. However, VR technology can provide virtual training tools and equipment, such as virtual treadmills and virtual throwing exercises, reducing the need for physical devices. This not only lowers costs but also increases the accessibility of the equipment[6].

3.2.3 Safety restrictions

During activities such as high jump and pole vault in athletics, there are certain safety risks. The use of VR technology can safely simulate these activities in a virtual environment, allowing students to practice high-intensity or dangerous movements, thereby reducing the risk of injury. Moreover, with VR technology, coaches and athletes can observe movements from different angles, which helps to identify potential safety issues and make timely adjustments[7].

3.3 Improve Technical Skills and Training Quality

VR technology can provide a highly immersive training environment, allowing athletes to train in simulated real or near-real conditions. This sense of immersion helps athletes better understand and master technical movements, thereby further improving their skill level[7]. VR technology can also assist athletes in refining their technical movements. By repeatedly practicing in a virtual environment, athletes can more accurately grasp technical details such as starting positions, running rhythms, etc. This repetitive practice can be conducted in a safe environment and is not limited by time or location, greatly enhancing the convenience and quality of training.

3.4 Enhance Practicality and Interactivity

VR technology can provide scientifically accurate sports technical guidance, helping

students acquire more technical knowledge. By visualizing complex and abstract sports theories, students can understand the technical essentials of track and field sports more intuitively, thereby improving their practical skills[3]. In the dynamic, real-time interactive virtual environment provided by VR technology, athletes can interact in real time with model athletes or other virtual characters, which helps improve their social skills and teamwork abilities, thereby enhancing the practicality and interactivity of training.

3.5 Promote Personalized and Autonomous Learning

VR technology significantly improves students' engagement and sense of immersion in physical activities through immersive experiences and virtual interactions, thereby enhancing their motivation for autonomous learning. According to Bandura's theory of self-efficacy, VR technology may enhance students' sense of self-efficacy by improving skill acquisition and successful experiences, stimulating motivation for autonomous learning[8]. Additionally, VR technology uses sensors to collect data, helping teachers adjust training plans based on student needs, thus achieving personalized learning and improving training efficiency and outcomes[9].

3.6 Improve Teaching Quality and Efficiency

Through VR technology for sports training, students can simulate key actions such as starting, accelerating, and sprinting without the need for actual sports facilities, helping them better master the technical essentials, thereby saving time and costs, and improving teaching efficiency. Additionally, by generating VR panoramic images, high-quality panoramic visual teaching is provided, which visualizes complex sports theoretical knowledge, allowing students to understand sports principles and technical movements more intuitively, increasing student engagement and dynamic skills, enhancing learners' enthusiasm and sports skills, thus improving the quality of teaching[3][10].

3.7 Promote an Immersive Learning Experience

VR technology can simulate real environments or objects and present them to users, creating a

sense of presence (presence being the subjective experience of the user between their physical location and the virtual environment) through the interaction of sensory stimuli, environmental factors, and personal inclinations. This achieves an immersive effect. Such "immersive" virtual classrooms can effectively stimulate students' sensory cognition and thought patterns, bringing a new learning experience and sensation to students, thereby injecting new creativity and innovative consciousness.

4. The Application of VR Teaching Platforms in College Track and Field Sports

4.1 Assist in Theoretical Course Learning

VR technology has shown significant advantages in the learning of track and field theoretical courses. It can simulate complex environments, allowing students to learn and practice track and field theories without the need for actual venues. This helps students better understand the key points of sports skills and tactics, and apply them to actual sports training, improving learning efficiency. Track and field sports involve a large number of technical details and key points of movements. VR technology helps students gain more technical knowledge by visualizing complex and abstract sports theoretical knowledge[3]. In addition, the multi-sensory interactive experience and multimodal learning methods of VR technology, such as text, audio, and video, make the learning process more vivid and intuitive. This not only increases the fun of learning but also helps students better understand and remember track and field theoretical knowledge[9].

4.2 Improve Specialized Skill Training

The application of VR technology in track and field teaching can significantly improve students' specialized skill levels. By creating highly realistic virtual environments, athletes can experience nearly real sports scenarios, effectively enhancing their interest and motivation for training, and improving training outcomes. Moreover, VR utilizes sensors and data analysis to monitor and evaluate athletes' movements in real-time, providing immediate feedback to help athletes adjust and improve their techniques, thereby enhancing their specialized skills. Additionally, VR technology

can provide personalized training plans and suggestions tailored to the specific conditions of athletes. In the learning of track and field specialized skills, such as javelin throwing, VR technology can offer different perspectives based on students' specific performances, helping them to understand the movement trajectories of various parts of the body more accurately. This allows for more precise correction of technical errors, strengthens memory, and improves the level of specialized training techniques.

4.3 Strengthen Specialized Psychological Training

VR technology is used in track and field coaching to improve and develop athletes' psychological skills. It allows athletes to train in simulated environments and uses physiological sensors to monitor indicators such as heart rate variability in real-time, providing dynamic feedback on the athletes' physical and mental states. This guides athletes through relaxation and psychological stress reduction training, thereby enhancing their adaptability and confidence in competitive environments[9]. Additionally, VR panoramic video technology utilizes high-fidelity 3D environments to conduct psychological skills training such as anxiety management and stress coping, improving athletes' mental resilience and performance in high-pressure competitions[11].

5. The Pathway to Building a VR Teaching Platform for University Athletics

5.1 Hardware Device Configuration and Maintenance

5.1.1 Head-mounted display (HMD)

The head-mounted display is the most essential hardware device for creating immersive visual experiences. Users enter a three-dimensional space generated by computers by wearing head-mounted displays, which can adjust the intensity and type of training according to the physical conditions and skill levels of different athletes, providing personalized training feedback. Coaches can also use VR head-mounted displays to observe athletes' responses to various visual stimuli, adjusting training methods to improve athletes' visual-cognitive coordination abilities[12].

5.1.2 Gloves and clothing

These devices can enhance the user's haptic feedback, allowing the user to feel objects and actions within the virtual environment. Among them, the glove includes various functions such as haptic feedback, finger bending sensation, grip strength prediction, and three-dimensional spatial positioning, to improve the user's sensations and actual experience in virtual reality. The sensors on the glove can also detect the movement of the fingers and transmit this information to the virtual environment, thereby providing a more realistic interactive experience.

5.1.3 Sensing technology

The use of data gloves to monitor learners' interactions and task performance in virtual environments; collecting learners' physiological data (such as heart rate variability HRV and electroencephalogram EEG) through sensors to assess their physical and mental states, and their potential impact on learning outcomes; employing hybrid tracking technology to capture athletes' movements, providing precise motion tracking and feedback, thereby enhancing the interactivity and enjoyment of training; additionally, sensor technology can analyze students' movement data and provide feedback, allowing teachers to tailor appropriate teaching content based on this, a method that not only improves the relevance of instruction but also boosts students' motivation to learn[13].

5.1.4 Computers and networks

High-performance computers and stable network connections are crucial for the operation of VR track and field teaching platforms. First, high-performance computing (HPC) plays a key role in processing large amounts of data and complex calculations, which is particularly important for real-time simulation and feedback in VR environments. At the same time, low latency can affect user immersion and response time, so it is necessary to use high-performance computers to reduce data transmission time[13]. Secondly, VR technology requires high network quality and stable connections to ensure the normal operation of the platform, demanding networks with low latency and high throughput to ensure a smooth and interactive user experience. Moreover, high-speed networks can support more users to be online simultaneously and can respond quickly to user actions, which is especially important for

online education platforms.

In summary, to ensure the normal operation of VR track and field teaching platforms, it is necessary to properly configure hardware devices such as head-mounted displays (HMD), gloves and clothing, sensing technology, computers, and networks, and to regularly maintain and update them to ensure the normal operation of the teaching platform.

5.2 Design and Maintenance of Software Systems

5.2.1 Modular design

Through the design of modules such as the user interface module, video recording and editing module, interactive simulation module, evaluation and feedback module, system management module, interactive design and content modification module, remote teaching and multimedia support module, and intelligent assistance module, the VR athletics teaching software system can adapt more flexibly to different teaching needs while improving teaching effectiveness and user experience. Each module should be designed based on the latest technology and educational theories to ensure the system's effectiveness and forward-looking nature.

5.2.2 3D animation technology

Through steps such as requirement analysis and goal setting, 3D modeling, scene design and layout, animation production, interactive design, application of virtual and real fusion technology, testing and optimization, and post-production editing and rendering, a VR track and field teaching software system can be designed that is both professional and highly interactive. Such a system not only provides an intuitive learning experience but also stimulates students' interest in learning, enhancing learning efficiency and classroom teaching effectiveness. Moreover, given the particularity of sports training, the software system should also integrate health monitoring features, such as heart rate monitoring, fatigue assessment, etc., to ensure safety during the training process. With continuous technological advancements, the software system requires regular updates and maintenance to maintain its performance and compatibility.

5.3 Teacher Training and Support

As VR technology becomes widespread in

education, the role of teachers is shifting from traditional knowledge transmitters to designers, facilitators, and coordinators. In VR athletic instruction, teachers are responsible for constructing the learning environment and guiding the learning process, which requires them to possess certain technical knowledge and skills to effectively utilize VR technology to create immersive learning experiences[5]. Therefore, providing professional training is crucial, including training on the basic principles of VR technology, operational methods, and how to apply VR technology in teaching. Considering the complexity of VR technology, teachers also need to learn about the management and maintenance of VR equipment. Continuous learning and practice are key to improving teachers' VR skills, and by simulating teaching scenarios, teachers can learn how to use VR technology in practice and evaluate their teaching effectiveness through peer review and student feedback[14]. Moreover, to support teachers in effectively using VR technology, schools and educational institutions should provide necessary technical support and resources, including access to high-quality VR teaching materials, software tools, and regular technical support services.

In summary, the above methods can effectively enhance teachers' application abilities in VR track and field teaching, thereby improving teaching quality and students' learning experience. This requires not only the teachers' own efforts but also the support and resource investment from schools and educational institutions.

5.4 Establishment and Improvement of the Teaching Evaluation System

5.4.1 Construct a scientific evaluation index system

Referencing the existing expert evaluation system for track and field teaching quality and the multiple intelligences evaluation system, and combining the characteristics of VR technology, design evaluation indicators suitable for VR track and field teaching. These indicators should include the accuracy of technical movements, learning attitude, physical fitness, and technical mastery ability, among others[10].

5.4.2 Adopting the multi-dimensional comprehensive evaluation method

Design a multi-dimensional comprehensive

evaluation method for track and field courses that reflects the overall development of students, including aspects such as technical skills, physical fitness, and psychological qualities. The aim is to comprehensively, objectively, and accurately enhance students' understanding of track and field course theories, their practical mastery of techniques, and their ability to apply them appropriately.

5.4.3 Introducing cooperative competition and three-dimensional evaluation strategies

Through the strategy of "cooperative competition and three-dimensional evaluation," students' motivation to learn is stimulated, and their active initiative in learning is enhanced. This strategy promotes interaction and competition among students, improving the quality of teaching.

5.4.4 Emphasizing the combination of procedural and outcome evaluation.

The evaluation system should not only focus on quantitative evaluation but also pay attention to qualitative evaluation, reflecting the combination of procedural and outcome evaluation, which helps to comprehensively assess students' learning effects and promote their all-round development.

5.4.5 Continuously optimize and update the evaluation system.

With the development of VR technology and educational concepts, the evaluation system should also be continuously optimized and updated. Feedback can be regularly collected through methods such as literature review, questionnaire surveys, and mathematical statistics, to adjust and improve the evaluation system.

In summary, establishing and improving the VR track and field teaching evaluation system is of great significance for promoting the application of VR technology in the field of physical education, improving teaching quality, facilitating personalized learning, and optimizing the allocation of teaching resources. It is necessary to comprehensively use various methods and technologies, continuously explore and innovate, to adapt to the trend of educational informatization development and the diverse needs of students.

5.5 User Feedback and Continuous Improvement

Establishing an effective user feedback mechanism for VR athletics teaching platforms

is crucial for evaluating and improving teaching quality, enhancing user experience and satisfaction, promoting personalized and interactive learning, and increasing the adaptability and accessibility of the system. Therefore, it is important to focus on the construction and implementation of the user feedback mechanism to ensure that the platform meets the needs of learners. Feedback can be regularly collected from users, including students and teachers, through methods such as questionnaires, interviews, and online feedback systems[10]. Data mining techniques can be used to analyze user feedback and usage data, identifying trends in changing user needs and common issues, providing a scientific basis for platform optimization. Based on the results of user feedback and data analysis, the VR teaching platform should be regularly updated to optimize teaching content, interface design, and interaction methods, thereby improving the user experience.

6. Conclusion

The application of VR technology in college track and field teaching can provide students with a safe and interactive learning environment by simulating real sports scenarios. It offers rich visual and sensory experiences, stimulating students' interest and motivation in learning, and improving learning efficiency. By simulating various track and field training environments, students can engage in simulated training without the need for actual facilities, thereby enhancing teaching efficiency and quality. Moreover, the personalized interactivity of VR technology allows for the creation of individualized training programs based on the different needs and levels of students, facilitating self-directed learning and personalized development. The real-time interactive features of VR technology ensure that students receive immediate feedback on their actions in the virtual environment, which helps to correct mistakes and optimize technical details. Combining visual and auditory stimuli, VR technology makes the training process more vivid and realistic, enhancing the efficiency and enjoyment of track and field teaching. In summary, VR technology will play an increasingly important role in higher education physical education, offering new directions

and possibilities for the development of sports education. VR technology will contribute to the cultivation of more outstanding track and field talents.

References

- [1] Li Jian, Zhou Rong, Chen Shaohua. Research on the Impact of VR Technology on Enriching School Physical Education Teaching Methods. *Contemporary Sports Technology*, 2021, (14): 60-63.
- [2] Zhu Yonghao, Wu Lei. The Application and Prospects of VR Technology in the Field of Sports. *Contemporary Sports Technology*, 2020, (06): 245-246+248.
- [3] Li, Chengbao, and Yupeng Li. "Feasibility analysis of vr technology in physical education and sports training." *IEEE Access* (2020).
- [4] Qingtao, Zhang. "Analysis and research on the combination of virtual reality technology (VR) and college sports training." *Journal of physics: Conference series*. Vol. 1486. No. 5. IOP Publishing, 2020.
- [5] Huang, Yuhua. "Use VR Technology to Construct Physical Education Teaching Auxiliary System." 2021 2nd International Conference on Information Science and Education (ICISE-IE). IEEE, 2021.
- [6] Lian, Huhu. "The virtual reality technology (VR) application in college physical education and training." 2021 4th International Conference on Information Systems and Computer Aided Education. 2021.
- [7] Yang, Fan, and Yang Miang Goh. "VR and MR technology for safety management education: An authentic learning approach." *Safety science* 148 (2022): 105645.
- [8] Bandura, Albert. *Self-efficacy: The exercise of control*. Macmillan, 1997.
- [9] Wang Yuqing. Feasibility Analysis of VR Technology in Sports Teaching and Training. *Contemporary Sports Technology*, 2020, (26): 37-38+41.
- [10] Kong, Dezhi, and Aoyao Zhang. "Research on Physical Education Teaching Mode in Colleges and Universities Based on VR Technology." *Applied Mathematics and Nonlinear Sciences* 9.1 (2023).
- [11] Ross-Stewart, Lindsay, and Russell Lee. "VR training and imagery training in esports." *Journal of Imagery Research in Sport and Physical Activity* 18.s1 (2023): 20230003.
- [12] Lei, Man Kit, and Kuangyou B. Cheng. "Biomechanical fidelity of athletic training using virtual reality head-mounted display: the case of preplanned and unplanned sidestepping." *Sports Biomechanics* (2022): 1-22.
- [13] Xu, Shigang, Xuhui Hong, and Hu Yang. "The Application of VR Technology based on Computer Vision in Physical Education." *Proceedings of the 7th International Conference on Information and Education Innovations*. 2022.
- [14] Yilmaz, Oguz, and Mustafa Tevfik Hebecci. "The Use of Virtual Environments and Simulation in Teacher Training." *International Journal on Social and Education Sciences* 4 (2022): 446-457.