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Research on the Application of Virtual Simulation Technology in the Training of International Police Talents



Abstract: - With the development of the global governance system and the transformation of international order, international police cooperation is being incorporated into the future development plans of police agencies worldwide. One of the bottlenecks that has constrained the training of high-level international police talents for many years is the relative scarcity of scenarios involving foreign police work in police practical training and teaching. Training methods have been limited to traditional modes such as oral narration and action demonstration. Utilizing the immersive and interactive characteristics of virtual simulation technology to simulate real international criminal activities, students can experience firsthand various types of international law enforcement situations. This helps cultivate their ability to adapt to sudden changes in multiple scenarios, addressing a key direction in the future development of police talent training by deeply integrating with new forms of crime, closely approaching practical combat to enhance training effectiveness, reduce training risks, and achieve the goal of promoting policing through science and technology.

Keywords: International police talent; new forms of crime; virtual simulation; practical training design

INTRODUCTION

As global integration deepens, the interdependence between countries around the world is becoming increasingly intimate, and criminal activities are also exhibiting new characteristics. Non-traditional forms of crime such as transnational network telecommunications fraud, cyber terrorism, cyber smuggling, and online drug trafficking are transcending geographical boundaries, proliferating and spreading among countries through the internet. Faced with new problems and challenges, international police cooperation is gradually being incorporated into the future development plans of police agencies worldwide, and the training of complex high-skilled international police talents has become an important component of police training efforts in various countries.

Virtual simulation technology, with its strong immersion and spatial independence characteristics, has been widely favored since the beginning of the 21st century, applied across various industries. Its application in the field of education originated in early 20th century Europe, where immersive and interactive features of virtual simulation technology were utilized to construct virtual practical teaching platforms for disciplines. It transformed complex internal structures from two-dimensional to three-dimensional, simulated real environments using 3D modeling and image rendering technologies, creating strong visual impacts that achieve realistic effects, immersing participants deeply. Moreover, users can alter virtual environments based on their consciousness and imagination, interact with environmental scenes, and replicate scenarios to form simulated

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"artificial environments". This enables individuals to experience intense visual, auditory, and other sensory perceptions in virtual environments through systematic programming, enhancing learners' sense of self-efficacy in immersive experiences within virtual scenarios.

LITERATURE REVIEW

With the emergence of virtual simulation technology, problems that traditionally required multiple trial-and-error attempts or risky experiments in real-world settings now have virtual and safe solutions. As this technology is increasingly applied in education, more researchers are paying attention to existing issues. For example, challenges such as the inability of system structures to adapt to different teaching scenarios, unclear classification of human-computer interaction modes lacking educational adaptability assessment, unreasonable methods of creating virtual integrated teaching scenes, and disconnects between teaching needs are being scrutinized. Simultaneously, the application of virtual simulation technology in police education models is gaining attention and undergoing further discussion and refinement by researchers.

Early studies abroad on the application of virtual simulation technology in police education have yielded rich results. For instance, Li S (2010) proposed the Integrated Simulation Training System (ISTS) specifically for police education. This system provides virtual training by configuring environmental parameters differently and integrates real-world experiences with ISTS to enhance police training effectiveness. AlShaima T. et al. (2023) established a virtual police training center in Abu Dhabi using constructivist teaching methods to support the system development process, proposing a more scalable training method that reduces health and safety risks. Yang Z (2024) utilized the vector space model to attempt constructing an innovative education system for training courses based on information technology, achieving more realistic and clearer scene images in dynamic simulations. In terms of evaluating the effectiveness of virtual simulation systems in education, Davies A (2015) conducted a study involving 372 police recruits, exploring their participation in simulation learning exercises centered around the use of force decision-making within police academy education programs. Zechner O. et al. (2023) conducted a three-year experimental project collecting requirements from experienced police trainers and industry experts, combining quantitative and qualitative analyses of human factors research and field trial results to identify advantages of VR training. This includes scenarios involving high-risk situations that are controllable and replicable in training environments, such as various weapons and dangerous equipment difficult to use in real-world training. The study emphasizes consistency between training pedagogy and technological implementation, proposing potential solutions. Koedijk M. et al. (2024) investigated the responses of 237 Dutch national police officers to virtual training. The study found that physically demanding tasks were significantly higher in the real-life (RL) group compared to the virtual reality (VR) group, while cognitive engagement was significantly higher in the VR group. It also discovered that participants' psychological constructs in VR could predict their VR experiences and participant characteristics, suggesting that VR-based Simulation-Based Training (SBT) can induce perceived stress and psychological constructs similar to or exceeding RL SBT, offering an effective supplementary tool for police training.

China's research on the application of virtual simulation in police education started relatively late. The initial applications of virtual simulation technology can be traced back to 2004, when the National University of

Defense Technology established a Virtual Weapon Equipment Simulation Teaching System. This system addressed issues such as the dismantling of dangerous weapons in teaching, significantly improving teaching efficiency. Ji Yantao (2018) argued the feasibility of applying virtual simulation technology to police law enforcement training, proposing the "three-dimensional integrated" training objectives covering action skills, use of force judgment, and tactical comprehensive application. Fu Wenbo (2021) demonstrated how virtual simulation technology effectively supplements traditional experimental teaching and enhances the practical training of public security forces, summarizing the advantages of virtual technology in public security training. In comparison to existing international research, domestic studies in China focusing on police education using virtual simulation technology mostly explore the development of teaching models and system applications. However, there is a lack of research results concerning the development and design of teaching cases based on surveys of current status and needs in police training at public security academies.

Existing studies have expanded the integration of police talent development with the convergence of virtual digital technologies, catering to evolving needs in police practical operations. They have innovatively attempted to enhance the effectiveness of police professional talent training models, providing important insights for this study. Building on these achievements, this research aims to improve the effectiveness of international police practical training by exploring and expanding the application of virtual simulation technology in teaching cases based on surveys and demands related to current foreign-related police training at public security academies, against the backdrop of rapidly evolving international crime trends.

ANALYSIS OF INTERNATIONAL POLICE TALENT CAPABILITY NEEDS

To study the application of virtual simulation technology in the training of international police talents, it is first necessary to clarify the professional competencies required for international police cooperation under the new situation of transnational crime. Based on the author's research in various entry-exit management departments across China, the professional competencies required for international police law enforcement cooperation can be summarized into four dimensions: professional knowledge, technical skills, practical abilities, and comprehensive qualities.

A. Professional Knowledge: Multilingual proficiency and legal knowledge to meet the demands of international police work

As China's comprehensive national strength grows, its involvement in major international affairs is increasing, and Chinese nationals are becoming increasingly globalized. Proficiency in only one foreign language is no longer sufficient to meet the job requirements of international police cooperation. It is crucial to cultivate talents proficient in "minor languages," specifically those spoken in countries along the "Belt and Road" initiative and widely used globally, such as Russian and Spanish, which are critical for future international police activities involving Chinese interests.

In addition, international police talents also need comprehensive knowledge of international law and the latest information technologies for cross-cultural communication. They must not only have a deep understanding of international legal theory and practice but also be capable of applying and expanding their cross-cultural

communication skills in practical work. Connecting language proficiency, legal knowledge, and cross-cultural communication skills with practical capabilities is essential for integrated development.

B. Technical Skills: Coordination and organizational skills among transnational law enforcement agencies

International police law enforcement cooperation typically involves participating in and advancing deep police cooperation between nations, coordinating international efforts to prevent and combat international criminal activities, safeguarding the interests of Chinese citizens abroad, and enhancing China's position in international police cooperation exchanges. These responsibilities demand high levels of communication and coordination skills among international organizations.

International police talents need to address emerging illegal activities in various socio-economic sectors domestically, implement effective management and services related to foreign affairs, strengthen international police cooperation, grasp new global trends in police work, demonstrate superior organizational and leadership skills in international police cooperation, and expand existing cooperative methods to form new international police frameworks.

C. Practical Abilities: Interpretation and adaptability in dynamic scenarios

In the context of international police law enforcement work, there are frequent occurrences involving cases of foreign nationals in China, violations of rights of overseas Chinese citizens, economic offenses, illegal entry and exit, drug trafficking, counter-terrorism, and other diverse fields of police expertise with varying demands for related professional knowledge. Additionally, there are collaborations with law enforcement agencies from other countries involving joint case handling, investigation, evidence collection, and judicial extradition across multiple domains. These tasks require dealing with various emergencies and even temporary escalations of criminal activities. The ability to interpret case scenarios timely, make rapid judgments, and flexibly respond in the most appropriate manner are crucial professional competencies for international police law enforcement talents.

Especially in complex and rapidly changing international law enforcement cooperation scenarios, police officers must be prepared to handle high-risk incidents or sudden escalations of criminal activities at any time. Therefore, they must be prepared in advance for various situations and cultivate the ability to handle complex, ambiguous, and potentially life-threatening situations through daily task training. These competencies are difficult to develop through theoretical learning alone.

D. Comprehensive Qualities: Stable physical and excellent psychological qualities in various scenarios

During law enforcement activities, police officers generally undertake tasks that require high physical and psychological demands. In virtual simulation training, these tasks can be reflected in training modules to develop on-the-spot reaction capabilities. The training mode of VR SBT induces real physical and psychological responses from students in virtual environments, exposing them to scenarios they may encounter in actual work and allowing them to gain relevant experience, thereby forming stable physical and psychological feedback.

Physical training responses, such as heart rate and levels of physical activity, can be obtained through cardiovascular endurance and physical conditions reflected during training periods. Police officers need to perform tasks under high-intensity physical stress, and virtual simulation training courses benefit from experiences under similar types of pressure. Similarly, psychological training responses, such as psychological control and perceived stress, provide trainees with cognitive awareness and understanding of relevant scenarios. For example, according to attention control theory, mental concentration is a compensatory strategy for countering stress and anxiety, habitual concentration being an effective way to offset stress and psychological stress.

APPLICATION PATH OF VIRTUAL SIMULATION TECHNOLOGY IN INTERNATIONAL POLICE TALENT DEVELOPMENT

Virtual simulation technology has brought many conveniences and opportunities to innovative teaching methods, reform of teaching modes, and enrichment of educational resources. Based on the early research results of virtual simulation technology in teaching and the competency profile of international police talents, this paper proposes three aspects for the ideation and design of a new quality-oriented foreign affairs police talent training model.

A. Creating Immersive Language Teaching Scenes through Virtual Interaction

Police foreign language, as a specialized language for specific purposes (ESP) in teaching, has been adopted by many language teaching institutions. Applying virtual simulation technology to language teaching can integrate ESP language teaching scenarios. Traditional police English teaching relies mainly on classroom settings, supplemented at most by audiovisual materials or hiring foreign teachers. Interactive methods are also relatively limited, primarily using forms such as dialogues and discussions between teachers and students or among students. Students lack real interactive experiences in their learning, which affects their deeper understanding of language application and makes it difficult to meet the foreign language proficiency requirements needed for police practical combat.

Creating a language learning environment using virtual MR (mixed reality) technology can provide learners with immersive, multi-sensory, interactive, and open learning experiences. By creating mixed reality language application scenarios during foreign language learning, students can effectively immerse themselves in task-based learning processes, enhance their knowledge, improve their abilities, and develop comprehensive qualities. During the transition between different scenarios, students can also be trained to use foreign languages to handle various problems with comprehensive adaptability.

B. Creating a Simulation Combat Teaching Environment Based on Real-Life Scenario Virtual Training (RL SBT)

Notably, the police officers are required to work under difficult situations and make impulsive decisions in the course of their duty. For instance, in as much as police deals with cases of infringement of the interest of overseas citizens, they are subjected to several limitations and expectations. They need to decide on the genesis

of the scenario, measure the probability of self or other harm, mobilize their human resources, identify the possible offender, consult with one or many recipients of service, or make relative concomitant actions like the application of force, arrest, or administering first aid.

Real Life Scene Based Training (RL SBT) focuses to act like real life events by creating training settings that are very realistic to a law enforcement setting. It involves activities like assuming the roles of the criminals or victims, and entails suitable places for training like simulated crime scenes complete with actual loud music that is characteristic of the scenes to make the training as realistic as possible. Students engage in complex training situations where, at the same time, they can use language, develop cognition, and physical qualities in particular circumstances necessary for teamwork, and discover behavioral solutions in reaction to the training situations occurring in some trainings. These trainings assist help the members of law enforcement understand the stress state of different situations and further boost their functioning in such conditions.

C. Enhancing Specific Scenario Adaptability Using Virtual Simulators (VR SBT)

Immersive VR training systems provide a 3D environment where trainees can freely move and interact with simulated environments. The advantage of VR SBT lies in its ability to operate independently of fixed training venues; once the VR system is set up in a sufficient space, training can be conducted anywhere. Furthermore, instructors can control the content of scenarios, creating a variety of simulated environments without needing additional resources such as physical props or different training locations in reality. Most VR systems also offer post-training reviews, allowing instructors and trainees to replay scenarios from different perspectives while providing various performance data. Accessing these post-training review resources from virtual reality systems enhances how instructors and trainees receive feedback after training. Compared to verbal feedback provided after RL SBT, the objective visual information provided during the system review process is less abstract. Therefore, using VR SBT may effectively complement RL SBT. Both RL SBT and VR SBT training methods trigger psychological responses, familiarizing law enforcement personnel with the stress perceived during training and demonstrating that psychological control is an effective method for handling complex real-life situations. Different training modules supported by various technologies also highlight the differences in application between VR SBT and RL SBT, identifying areas where these two modes can complement each other and continuously improving them in the future.

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FUNDING

This work was supported by the Fourteenth Five-Year Plan of Educational Science of Jilin Province in 2022: 'Research on Innovation of foreign-related police personnel training mode in Jilin Province under the background of globalization' (Project No. ZD22162).

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