

Construction and Research of Practical Training Teaching of Acupuncture and Moxibustion in Chinese Medicine Based on 5G and VR Technology

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Keywords: 5G; virtual reality; Chinese medicine acupuncture; practical training teaching

Abstract: Conducting contextualized practical training teaching in TCM is one of the important ways to cultivate innovative people in TCM. How to better apply the learned knowledge of TCM acupuncture to the practical training teaching is the focus of acupuncture teaching reform. In this paper, we will break through the traditional teaching model and propose a TCM acupuncture practical training teaching constructed by using 5G and virtual reality technology to improve the learning experience and thus promote learning, achieve the union of medicine and teaching, and innovate the methods and contents of TCM practical training teaching, in order to provide an innovative perspective for TCM practical training teaching.

1. Research Background

The deep integration of information technology and education teaching is the inevitable trend of education development. Relying on 5G communication technology, smart education is developing rapidly with the boost of education informatization and the fourth industrial revolution, and gradually forming a new pattern of education. Meanwhile, for medical education, the General Office of the State Council issued the "Guiding Opinions on Accelerating the Innovative Development of Medical Education", which mentions the need to accelerate the innovative development of medical education. In addition, the "Construction Program of Highlands of Chinese Medicine in Guangdong-Hong Kong-Macao Greater Bay Area (2020-2025)" issued by the State Administration of Traditional Chinese Medicine, Guangdong-Hong Kong-Macao Greater Bay Area Construction Leading Group Office and Guangdong Provincial People's Government also points out the need to promote medical education synergy and build a first-class medical education system. This is the trend for higher TCM education to develop through the research and realization of smart education combined with information technology, and also to play a technical support for the realization of education and teaching in universities, and to provide an open education and teaching environment and a convenient and comfortable living environment, thus providing the possibility of TCM talents cultivation and academic radiation.

Under the new situation of higher education transformation, it has become an important and urgent task for higher TCM education to promote education and teaching reform systematically, scientifically and efficiently by combining its own characteristics. VR virtual simulation technology, represented by new information technology, is deeply integrated with education and teaching to promote classroom revolution, which will focus on strengthening students' practical ability cultivation. In-depth discipline construction with 5G+VR technology will highlight the characteristics of higher Chinese medicine education, achieve the strategic goal of high-quality development, and actively serve the country as well as the major strategies of Guangdong, Hong Kong and Macao Greater Bay Area. Thus, it is inevitable that 5G+VR technology will be used to explore and implement a higher level of practical training content, so that it can be implemented effectively.

2. Current situation of practical training teaching of acupuncture and moxibustion in Chinese medicine

Acupuncture originated in China, and is a discipline guided by the theory of Chinese medicine, researching meridians and acupoints, acupuncture techniques and treatment methods, exploring the laws of acupuncture and moxibustion to prevent and treat diseases, and clarifying the mechanism of acupuncture. The practical training of acupuncture is an important part of TCM acupuncture, which is an important way to deepen students' understanding of TCM acupuncture and improve their practical ability and comprehensive quality. How to better apply the learned knowledge of TCM acupuncture to clinical practice is the focus of TCM acupuncture practical training teaching reform. Based on the full understanding of the characteristics and connotation of the discipline, there are some problems in the realistic practical training teaching of acupuncture and moxibustion for the clinical characteristics of the strong practicality of TCM acupuncture.

2.1. The content of theory and practice is too abstract

The main content of acupuncture and moxibustion includes three parts: basic theory of acupuncture and moxibustion, acupuncture and moxibustion techniques and acupuncture and moxibustion treatment. The basic theory of acupuncture and moxibustion mainly introduces the knowledge of meridians and acupoints. Acupuncture and moxibustion techniques mainly explain the role and operation of acupuncture instruments, while acupuncture and moxibustion treatment mainly introduce the clinical theoretical knowledge of acupuncture and moxibustion and the acupuncture and moxibustion treatment of common diseases in various disciplines. Acupuncture requires students to master the distribution of meridians, the positioning of acupuncture points, the localization of acupuncture points, and the main treatment, etc. The system is complex and specific, and requires accurate grasp and firm memory, which requires students to have high comprehension, abstract thinking ability and imagination. At the same time, acupuncture and moxibustion is a discipline that focuses on clinical treatment and requires high requirements for application, thus requiring students to continuously improve clinical hands-on and practical applications.

2.2. Poor integration of theory and practice

At the present stage, the training of TCM talents mainly relies on traditional teaching mode, which has a long training period and great difficulty in skill enhancement. Theoretical knowledge is mostly taught by courseware, and the theory is disconnected from practice. In the past, in traditional Chinese medicine meridian and acupuncture courses, teachers taught the theory of acupuncture points and meridians, but also needed to be accompanied by practical training to improve accuracy, but the practical practice is often peer-to-peer needle sticking, which requires high operational skills and experience, and the cost of practical training is high, and the risk of operation is also high, for some students, firstly, they will have a sense of fear, and secondly, they will have discomfort symptoms such as needle sickness, etc. The learning effect is limited because of the possibility of needle sickness.

Based on the above problems, it is urgent to explore the practical teaching methods of acupuncture and moxibustion in order to achieve the best teaching effect. the emergence of 5G technology brings opportunities and challenges to traditional education, how to promote the reform of practical training of acupuncture and moxibustion through 5G+VR technology, strengthen the development of acupuncture and moxibustion, and intertwine with clinical time, which is of great significance to cultivate a new generation of TCM talents.

3. Advantages of 5G-based and virtual simulation technology in acupuncture practical training teaching in Chinese medicine

With the continuous innovation of science and technology, multidisciplinary integration of practical training simulation teaching gradually emerged, the "virtual mode" of virtual simulation technology and artificial intelligence technology of knowledge engineering and expert system are widely used in the practical training mode, which is an effective measure to improve the teaching

effect of TCM skills and improve the objective evaluation system of skills practice. It is an effective measure to improve the teaching effect of TCM skills and to improve the objective evaluation system of skills practice, which is an important guiding significance for the teaching application of "medical-industrial combination" and "medical-teaching combination" in the field of TCM and the optimization and improvement of TCM teaching system, and will also become an inevitable development of teaching mode reform.

3.1. Reconstructing Chinese medicine acupuncture practical training teaching using 5G+VR technology

The application of 5G technology, through ultra-low latency and ultra-wide connection of multimedia video, through virtual reality (VR)/augmented reality (AR) and other virtual simulation resources [1], makes the response speed required for VR/AR technology will be faster than human response, which will boost the smoothness and stability of various virtual teaching applications. In addition, the 5G transmission can realize the interactive teaching of acupuncture course in different places, effectively solve the real problem of uneven distribution of teachers' resources, realize the interaction between classroom teachers and students and real patient environment through sensing technology to improve the learning experience, and then promote learning, achieve the union of medicine and teaching, can innovatively realize the "online teaching, online learning, online practice, online examination" of Chinese medicine acupuncture skills, breakthrough theoretical teaching and skills "It can break through the dependence of theoretical teaching and skill teaching on environmental conditions, open up the skill training mode of online learning and offline practice, and promote the new education form of teaching and learning mode change.

3.2. Building VR scenario teaching to enhance the integration of theory and practice

Through 5G+VR (virtual reality) technology, we combine dialectical point selection, acupuncture acquisition technology and virtual reality with the guidance of acupuncture clinical evidence, and build 3DVR model, which is applied to acupuncture experimental teaching, realizing the visualization and quantification of the whole practical training, effectively solving the problems of safety, standardization and repeatability in acupuncture teaching, and presenting the human body structure to students in three-dimensional form. 5G+VR can effectively cultivate students' higher-order thinking skills in the process of practical training teaching [2].

By building a giant screen, VR helmet and naked-eye 3D cell phone, 5G+network practical training platform and other carriers, teachers can improve the complexity and diversity of teaching contents, and use comprehensive and improved VR teaching to make students get deeper and multi-faceted learning, teachers can improve the complexity and diversity of teaching contents, and use comprehensive and improved VR teaching to make students get deeper and multi-faceted learning [3]. By observing the phenomenon of needling, participating in learning and interacting with the practical training content, students can understand the concepts and principles of acupuncture more deeply, and at the same time more effectively promote students' active learning and provide conditions for students to explore new knowledge and skills in the process of TCM practical training. On the one hand, the immersive learning experience that allows students to intuitively experience the real situation of clinical acupuncture will effectively stimulate students' learning interest and initiative, which can effectively enhance the accuracy of TCM diagnosis in practical training, strengthen the training of case analysis and reasonable needle-tying skills, make up for the shortage of traditional teaching, and effectively cultivate students' TCM thinking and skills. On the other hand, it breaks the barriers of traditional practical training teaching, and with the communication technology of 5G network "super speed and low latency", it effectively breaks the limitation of time and space, which supports ubiquitous and mobile learning outside the classroom, realizes remote intelligent teaching, and improves the quality of interactive practical training teaching.

4. Construction of 5G and virtual simulation technology based on acupuncture practical training in Chinese medicine

VR/AR and other virtual simulation teaching resources are often difficult to be applied in the actual teaching scenario on a regular basis due to excessive content. 5G technology will, by virtue of superb mobile broadband, realize the transformation from resource client service mode to resource cloud service mode, solve the bandwidth and capacity problems, and build a modern TCM practical training platform with realism, immersion and interaction, generating a realistic 3D audio-visual sensation, observing the 3D position and anatomical structure of meridians and acupoints from any angle and at any time, and presenting the virtual human body with high realism and immersion, so that learners as participants can naturally experience and interact with the virtual world through appropriate devices.

The virtual reality scenario of acupuncture teaching is established according to the teaching needs and environmental characteristics, and the virtual imitation of acupuncture training course includes two major teaching contents of "meridians and acupoints" and "acupuncture therapy" and "learning mode". The virtual reality training course of acupuncture includes two teaching contents of "meridian and acupoint science" and "acupuncture treatment" and three modes of "learning mode", "interactive assessment" and "meridian point editing".

The teaching resources include: 14 meridians, extra-meridian points, specific points, position fixing points, functional points, acupuncture treatment, famous medical cases, classic medical books and anatomical structures. Using this module, you can teach various knowledge of meridians and acupoints, acupuncture treatment plans for 100 diseases and practice acupuncture, etc., to meet the teaching needs in all aspects. The teacher can check the learning situation of each student through the background; the interactive assessment module provides various ways to comprehensively assess the mastery of acupuncture knowledge, and the teacher can set the difficulty level and content of the test; the meridian editing module provides convenient tools such as bone degree, sagittal plane, coronal plane, horizontal plane and distance measurement, etc., to realize direct information editing of new points, existing points and meridians, so that what you see is what you get. Through the virtual reality, students can perform a variety of interactive operations for the highly accurate human body reconstruction model, giving students the possibility to repeatedly simulate operations without touching the real human body in a safe environment, and teachers of acupuncture disciplines can apply the acupuncture pluralistic system to establish the VR teaching theory of Chinese medicine meridians and acupuncture. Newly created curriculum materials and online teaching, providing students with immersive virtual reality acupuncture teaching.

Adopting key technologies such as 5G transmission, three-dimensional dynamic environment generation modeling of human-computer interaction and virtual simulation display, with VR headset and naked-eye 3D display, it can effectively realize holographic three-dimensional 3D practical training classroom. The construction of a desktop-style 5G+VR virtual reality teaching and training area provides acupuncture learners with a more intuitive and realistic meridian acupuncture practical training experience. Learners can simulate real meridian acupuncture operations in the virtual scene and are free to explore different theoretical teaching, practical methods and acupuncture techniques, effectively improving learning efficiency and practical operation.

Using virtual reality technology, a real acupuncture scene is created and restored, including meridians, acupuncture points, acupuncture equipment and other elements. Learners can conduct practical acupuncture training in this virtual scene, and there will be corresponding tips and guidance during the operation. First, in the virtual scene, each meridian and acupuncture point will be labeled and provided with corresponding introduction and description. Learners can deepen their understanding of meridian acupuncture knowledge through virtual reality technology by understanding the location, role and operation method of each acupuncture point in depth. Second, in the virtual scenario, common acupuncture equipment will be introduced and demonstrated, with detailed instructions on their use and precautions. Learners can simulate the real operation process through virtual reality technology and get familiar with the usage and operation techniques of each equipment. Third, learners can conduct simulated acupuncture practical training in the virtual scenario to learn and practice operating various acupuncture techniques. The system will evaluate

and give feedback based on the accuracy and process of the operation, helping learners to quickly improve the actual acupuncture operation ability.

5. Summary and Outlook

Talent is the key to the development of the industry, and the integration of 5G+VR cutting-edge technology into the training of TCM talents is the key support for the rapid development of China's TCM industry and the comprehensive training of talents, with the idea of "integration of TCM medicine and industry, medical education", the establishment of acupuncture practical training teaching integrating acupuncture, biomechanics and artificial intelligence, through simulation. Through simulation training, students can realize the repeatability and standardization of acupuncture manipulation, more easily solve the requirements of situational and natural interaction of learning media, improve the change of TCM personnel training mode, realize the real-time interaction between acupuncture theoretical knowledge and students, stimulate learning interest and self-learning exploration ability. In the future, while strengthening the innovation of teaching digital technology tools, it is necessary to further analyze from teachers' perspective, introduce more clinical scenarios as teaching materials in the teaching process, and use digital teaching reform to further improve the teaching level of acupuncture and moxibustion practical training in Chinese medicine.

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