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Reflection on the Development and Application of AI Teaching Resources in the Teaching Ecology of Higher Vocational Medical Education

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Abstract: With the rapid development of science and technology as well as artificial intelligence (AI) technology, AI teaching resources have gradually become a crucial component of the current teaching system. This new type of teaching resource not only provides new technical support for the existing teaching system but also enriches it with additional educational content. Influenced by traditional teaching models, higher vocational medical education still faces challenges such as a single type of teaching resources, insufficient practical scenarios, and inadequate emphasis on student-centered learning. However, with the changes of the times and continuous reforms in the field of education, the industry's demand for medical professionals has become increasingly diversified. This shift has also raised higher requirements for talents' abilities in knowledge integration, practical application, and innovation. Therefore, the introduction of AI teaching resources into higher vocational medical education has become an important path to promote educational reform. Through the in-depth integration of AI technology, teaching resources can become more intelligent and interactive, providing more precise and personalized support for the training of medical talents. This not only effectively enhances students' adaptability and comprehensive literacy in future careers but also offers an effective approach for cultivating "future-oriented" talents.

Keywords: Higher vocational education; Teaching ecology; AI teaching resources; Reflection on development and application

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1. Introduction

In the entire teaching ecological system of higher vocational medical education, teaching resources play a pivotal role and are one of the key factors ensuring the quality of students' learning outcomes and educational effectiveness. High-quality teaching resources not only shoulder the important responsibility of knowledge transmission but also further optimize teachers' current teaching strategies, continuously improving the efficiency and quality of classroom teaching. Therefore, against the backdrop of the continuous advancement of educational informatization, the development and application of artificial intelligence (AI) teaching resources

can inject new vitality into higher vocational medical education. It can effectively promote the transformation of teaching models from teacher-centered to student-centered, thereby realizing the intelligent development of the teaching process. Starting from the current status of higher vocational medical courses, this paper thoroughly analyzes the importance of developing and applying AI teaching resources in these courses, and discusses the paths and reflections on the development and application of AI teaching resources in the teaching ecology of higher vocational medical education.

2. Current status of teaching in higher vocational medical courses

Current teaching of higher vocational medical courses adheres to the educational philosophy of integrating theory with practice and aligning with job requirements. Based on existing on-campus laboratories and training rooms, practical teaching is carried out using typical industry cases, focusing on core professional knowledge in areas such as disease consultation and medication recommendation, clinical nursing, pathological testing, and drug quality control [1]. In terms of teaching methods, teachers mostly adopt lecturing and group experiments to help students construct a framework of medical professional knowledge. However, from the perspective of actual teaching practice, there are still issues that need improvement, such as the disconnection between teaching content and industrial technological development, slow update of teaching resource databases, and insufficient authenticity in simulating practical teaching scenarios. These problems result in students' acquired knowledge, skills, and literacy hardly meeting the actual development needs of current positions, affecting the comprehensive improvement of their overall abilities [2]. Specifically, current teaching resources are mostly limited to static textbooks and multimedia courseware, and their update mechanisms and efficiency struggle to keep up with the development of medical science and technology, leading to a serious lag in the knowledge and skills that students are exposed to [3]. Additionally, traditional resources lack effective interactivity and personalized technical support for feedback on students' learning behaviors and personalized guidance, making it difficult to meet the differentiated needs of different students during teaching. Ultimately, there remains a certain gap between teaching and the practical operation requirements and professional literacy needs of the medical industry for technical and skilled talents.

3. Importance of developing and applying AI teaching resources in higher vocational medical courses

3.1. Breaking teaching bottlenecks

Core teaching contents in higher vocational medical courses, such as different pharmacological mechanisms, pathophysiological processes, and drug molecular structures, are highly abstract. Students already face difficulties in initially absorbing this knowledge, and teachers mostly rely on one-way lectures for instruction. Traditional lecturing methods mainly rely on text descriptions and static wall charts, which struggle to fully mobilize students' learning initiative. Moreover, there are relatively few intuitive teaching tools, making it difficult for students to effectively connect knowledge with practical applications, resulting in suboptimal learning outcomes [4]. However, through the development and application of AI teaching resources, abstract and complex knowledge can be transformed into visual, readable, audible, and interactive dynamic models, enhancing the intuitiveness and perceptibility of relevant content. This helps students more directly understand drug action mechanisms and physiological changes, improving overall learning effectiveness. For example, AI technology can be used to construct more realistic human organ models, allowing students to conduct

immersive observations through virtual reality equipment [5]. This teaching method enables teachers to break through the bottlenecks in traditional teaching, making abstract pharmacological processes more intuitive and continuously deepening students' understanding of complex medical concepts.

3.2. Enhancing students' core job competences

In the current industrial development, medical majors increasingly demand high practical operation abilities and professional literacy from students, especially in emerging fields such as disease consultation and medication recommendation, medication guidance, and smart elderly care, which require technical talents with strong practical skills and innovative thinking [6]. However, traditional practical teaching is restricted by factors such as experimental conditions, equipment costs, and safety risks, making it difficult for all students to conduct high-frequency practical operation training, resulting in generally weak hands-on abilities among students. AI teaching resources support the use of virtual simulation technology to reconstruct real experimental scenarios, allowing students to repeatedly practice operations such as drug preparation, pharmaceutical production, and clinical medication analysis in a virtual environment, thereby effectively improving the proficiency and standardization of practical operations [7].

3.3. Promoting innovation in teaching methods

Under traditional teaching models, students with different academic foundations exhibit varying learning abilities. Some students have inconsistent mastery of basic knowledge, such as pharmacology and pharmaceutics, rendering the one-size-fits-all teaching approach ineffective [8]. Meanwhile, the teaching resources available to students are overly homogeneous, making it difficult to meet their personalized needs. In contrast, AI teaching resources can accurately analyze students' learning progress, habits, and knowledge acquisition through intelligent learning systems. Based on individual performance, they can precisely deliver personalized learning content and practice tasks, thereby achieving tailored education [9]. Additionally, supported by AI teaching resources, teachers can leverage intelligent systems to implement innovative teaching models such as flipped classrooms and blended learning. This enhances the efficiency of teacher-student interaction and classroom participation, continuously stimulating students' interest in learning and their ability for self-directed study. Ultimately, it facilitates the transformation of teaching from a teacher-centered paradigm to a student-centered one.

4. Development and application paths and reflections on AI teaching resources in the teaching ecology of higher vocational medical education

4.1. Developing AI teaching resources with comprehensive development as the core

In the process of developing AI teaching resources, higher vocational colleges need to focus on students' comprehensive development, emphasizing the cultivation of professional skills, vocational literacy, and innovative abilities. While aligning with training objectives, they should break the limitations of the current singular teaching resources to construct an intelligent teaching system that integrates knowledge transmission, ability training, and quality cultivation [10]. Specifically, in terms of knowledge transmission, teachers can combine AI technology with abstract knowledge, such as pharmacological mechanisms and pathophysiological processes, to transform them into dynamically visual 3D models or interactive animations. Such dynamic teaching resources help students more intuitively understand the action pathways of drugs in the body. Students can enhance their perception of abstract knowledge through interactive operations like rotating and zooming, while AI-supported synchronous knowledge explanations and in-class tests enable timely consolidation and

feedback of knowledge [11]. In terms of skill training, AI teaching resources can highly replicate high-risk, high-cost practical projects such as pharmaceutical preparation, intravenous puncture, and drug testing through virtual simulation technology, including realistic scenarios like sterile workshops, community pharmacies, and clinical wards. This allows students to repeatedly practice operational procedures in a virtual environment, effectively reducing training costs and safety risks. During this process, the system can instantly capture students' incorrect operations (such as non-standard aseptic techniques or dosage calculation errors) and provide real-time feedback, helping them correct mistakes promptly, reinforce correct procedures, and compensate for the shortcomings of traditional teaching [12]. From a development perspective, reflection reveals that some teaching resources in the current system tend to focus solely on skill training while neglecting the cultivation of vocational literacy. They also pay insufficient attention to fostering teamwork and innovative thinking, with widespread homogenization of relevant teaching resources. In subsequent development, it is necessary to further enrich the forms of teaching resources using AI technology in accordance with the diverse needs of students' career development, ensuring that resources truly serve students' comprehensive development.

4.2. Constructing a collaborative application model of "AI + full teaching process"

To further improve the application of AI teaching resources, we need to start from the entire current teaching process and integrate them into every link of the full teaching process of higher vocational medical education. A closed-loop teaching support system should be formed, covering pre-class preparation, in-class teaching, and after-class consolidation [13]. In the pre-class preview stage, teachers can use AI resources and combine the teaching objectives of the current course to generate personalized preview tasks based on students' past learning data. For example, students with weak basic knowledge can be provided with learning videos and self-assessment questions that focus more on consolidating basic knowledge to help them sort out core knowledge points; for students with strong learning abilities, more challenging industry case analyses and extended exploration tasks can be assigned to stimulate their interest in in-depth learning and prepare them for subsequent courses. In the in-class teaching session, teachers can take AI resources as the main tool to carry out interactive teaching. For instance, in theoretical classes, teachers can first use AI-generated 3D pharmacological models to guide students to observe the dynamic process of drug-receptor binding, then organize students to discuss in groups the key details of the drug action mechanism, and then use the AI system to collect the discussion results of each group and make real-time comments, thereby enhancing students' overall classroom participation and thinking activity [14]. Finally, in the after-class consolidation stage, AI can automatically generate personalized consolidation exercises and extended tasks according to students' classroom performance. For example, for key knowledge, it can recommend mind maps and extended reading materials, and dynamically and systematically adjust the difficulty and content of subsequent follow-up exercises based on their answer performance, ensuring the continuity and pertinence of students' learning in the after-class consolidation stage. From the reflection on specific implementation, teachers have different levels of mastery of AI technology. Some teachers may replace teaching arrangements with AI technology in the teaching process, and the degree of adaptation between relevant AI resources and course content still needs further optimization.

4.3. Establishing and improving the existing resource guarantee system

After completing the development of AI teaching resources and the optimization of teaching application methods, a sound resource guarantee system should be established to ensure that AI teaching resources can play their due teaching role in practical applications. Specifically, at the technical level, it is necessary to ensure

that the AI platform can operate stably and have sufficient data processing capacity and response speed to avoid teaching interruptions caused by equipment failures. At the same time, it is necessary to ensure the safe operation of data and regularly update algorithm models to improve the accuracy and security of AI resources. At the institutional level, it is necessary to establish a resource usage and feedback mechanism, encourage teachers to record the application effect of AI resources at any time during use, and put forward corresponding optimization suggestions based on their own use experience, so as to provide data support and improvement directions for the optimization of the background system [15]. In addition, it is also necessary to dynamically adjust resource content based on students' specific learning results and related data to ensure that resource updates are always synchronized with teaching needs, thereby ensuring that resources are always timely and targeted. Finally, in terms of resource management, teachers need to establish a unified resource classification and storage system, conduct tagged management of AI resources according to course modules, knowledge point difficulty and teaching scenarios, so that teachers can quickly locate and retrieve the required teaching resources in the teaching process, and students can also independently find the required learning materials according to tags, thereby continuously improving the use efficiency of relevant resources and ensuring that AI teaching resources can continuously serve the teaching needs of higher vocational medical education.

5. Conclusion

AI teaching resources have become a very important teaching support in the current medical teaching system of higher vocational colleges. Their excellent teaching auxiliary functions have broken the limitations of traditional teaching resources on time, space, and form, and can provide more intelligent and modern teaching support for the existing teaching system. With the continuous update of AI technology and the in-depth integration of educational concepts, the forms of AI teaching resources can be further enriched, thereby promoting the in-depth integration of AI and medical education and improving the teaching quality of higher vocational education.

Disclosure statement

The author declares no conflict of interest.

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