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Research on the Teaching Reform of Medical and Pharmaceutical Majors in Higher Vocational Colleges under the Background of Artificial Intelligence

Xianlin Yuan*

College of Life and Health Sciences, Guangdong Industry Polytechnic University, Guangzhou 510270, Guangdong, China

**Author to whom correspondence should be addressed.*

Abstract: With the continuous development of information technology, society has now entered the intelligent era, and artificial intelligence (AI) technology has gradually become a new and valued teaching method in the field of education with the progress of the times. Currently, the teaching of medical and pharmaceutical majors in higher vocational colleges needs to conform to the trend of the times, actively integrate AI technology into the teaching process to continuously improve students' learning efficiency, and at the same time provide a new development direction for the existing teaching system, thereby promoting the overall improvement of teaching quality in medical and pharmaceutical majors of higher vocational colleges. Starting from the necessity of integrating AI into the classroom teaching of medical majors in colleges and universities, this paper deeply explores the effective paths for teaching reform of medical and pharmaceutical major courses in higher vocational colleges under the background of AI, and puts forward the key points of AI-enabled innovation in teaching models and methods. It is hoped that this study can provide new ideas for front-line teachers to adjust the future medical professional teaching classrooms, and thus continuously promote the innovation and development of the overall teaching of these majors.

Keywords: Artificial intelligence; Medical and pharmaceutical majors; Teaching reform; Teaching evaluation

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1. Introduction

Under the global wave of digital technology revolution, AI technology is reshaping the ecological landscape of the medical and health industry with unprecedented depth and breadth. From intelligent screening in drug research and development, precise decision-making in clinical medication, to intelligent management of medical

services, AI technology has fully penetrated into the core links of the medical and pharmaceutical industry. At the same time, in the process of comprehensive reform in the current education field, modern intelligent technology has become a crucial driving force for promoting the overall development of teaching. Therefore, in the current teaching of medical majors in higher vocational colleges, the traditional teaching methods can no longer meet the increasingly diverse learning needs of students, which, to a certain extent, indicates the lag of traditional teaching methods. The application of AI technology in teaching can effectively enhance students' ability to transform knowledge during the learning process; moreover, more innovative teaching and practical methods can help them further improve the ability to apply the knowledge they have learned in practical work, thereby promoting the overall progress of students in learning. Therefore, to better align the cultivation of medical and pharmaceutical major students in higher vocational colleges with future job positions, it is necessary to introduce AI technology in a timely manner.

2. The necessity of integrating artificial intelligence into the classroom teaching of medical and pharmaceutical majors in colleges and universities

2.1. Helping teachers improve teaching efficiency

For higher vocational colleges, the efficiency and quality of teaching are important criteria to ensure that professional classroom teaching maintains a high level. Therefore, integrating artificial intelligence (AI) technology into the teaching of medical and pharmaceutical majors in higher vocational colleges is a key link in enhancing the overall effectiveness of teaching. For teachers, the application of AI technology can help them complete some pre-class preparation work that is highly mechanical and repetitive, while also assisting in the development of creative teaching activities in the classroom [1]. With the support of modern information technology, AI can also provide more intelligent teaching auxiliary tools for the entire teaching process, such as intelligent lesson preparation systems and online learning platforms, helping teachers quickly integrate relevant documents and teaching materials [2]. For example, when preparing courses related to pathology, teachers can use intelligent systems to automatically search for the latest medical achievements or typical cases, which greatly improves their lesson preparation efficiency, saves lesson preparation time, and allows them to devote more energy to subsequent teaching design, thereby enhancing the corresponding teaching efficiency.

2.2. Enhancing students' personalized learning experience

The classroom teaching in most higher vocational colleges is mainly dominated by teachers' lectures on theoretical knowledge, and students are generally in a standardized and stereotyped state of passive reception. This state has a certain impact on the improvement of their learning innovation, and thinking abilities. Moreover, against the background of an increasingly information-based era, students' learning needs have become more diversified, and they are more in need of teaching arrangements that support their personalized learning [3]. AI technology can intelligently analyze students' in-class learning behaviors, current interests and hobbies, and overall cognitive levels. Based on the different needs and characteristics of each student, it formulates personalized learning plans and provides customized learning resources. This ensures that students can more independently choose learning content and methods, and better cultivate their autonomous learning and innovative abilities [4].

2.3. Effectively improving the evaluation mechanism

At present, the teaching evaluation method for medical majors in higher vocational colleges still adopts the traditional approach of using grades to assess students' learning effects at a certain stage. Although this evaluation method can reflect students' learning status to a certain extent, it cannot fully show the progress students have made throughout the learning process. The integration of AI technology can make up for this deficiency. Big data and intelligent tracking systems can effectively record all aspects of students' learning processes, both in and out of class, including their progress and setbacks in specific areas. At the same time, combined with intelligent assessment technology and feedback mechanisms, it can provide teachers with a more comprehensive and objective evaluation result of students [5]. Through these results, teachers can not only obtain students' exam scores but also analyze their participation in the learning process and the improvement of various abilities. The changes at a certain stage can directly reflect the effectiveness of the teaching methods used by teachers, thereby helping teachers adjust subsequent teaching strategies in a timely manner and maximize the scientificity of teaching decisions [6].

3. Effective paths for the teaching reform of higher vocational medical courses in the context of artificial intelligence

3.1. Reconstruct the curriculum system and integrate artificial intelligence technology

In the current era, with the improvement of various medical equipment and the emergence of new diseases, the pharmaceutical industry's requirements for professionals in related fields are constantly increasing. However, most curriculum systems of higher vocational medical majors are centered on basic medical theories and clinical practical skills. Although this basic knowledge can help students improve their abilities to a certain extent, it cannot fully meet the industry's demand for interdisciplinary talents [7]. Therefore, in the teaching process, medical professional teachers need to break the limitations of the original curriculum, reconstruct the teaching system, integrate the latest existing medical achievements with contemporary artificial intelligence technology, and continuously expand the knowledge horizon of students. Specifically, teachers can specifically add courses related to artificial intelligence and medicine to the teaching system, such as the course "Introduction to Medical Artificial Intelligence." This course can systematically introduce to students the application scenarios and specific operation methods of artificial intelligence in various fields such as disease prediction, drug research and development, and medical image diagnosis, enabling them to have a certain understanding of relevant knowledge directions. At the same time, supporting courses such as "Big Data and Medical Information Processing" and "Introduction to Deepseek and Its Applications" can be set up to help students master certain data collection and analysis methods, so that they can use big data technology to explore potential medical laws in the future, thereby providing data support for subsequent disease diagnosis and treatment as well as drug research and development [8]. In addition to adding new courses, teachers can also optimize the content of existing courses. For example, when explaining the content of pathology-related courses, teachers can use artificial intelligence technology for intelligent image recognition to help students quickly identify the characteristics of pathological sections, thereby improving the accuracy of their diagnosis and promoting the integration of the knowledge they have learned with practice. This method can effectively optimize students' ability to absorb and transform the knowledge they have learned, thereby improving their overall learning quality.

3.2. Innovate teaching modes and enhance students' comprehensive abilities

Against the backdrop of the continuous rise of artificial intelligence, although the traditional teaching mode can help teachers achieve the corresponding teaching goals, for a relatively boring major like medicine and pharmacy, the teacher-centered teaching mode in traditional classrooms can hardly stimulate students' interest in learning anymore, and their innovative abilities will also be affected under the repeated teaching mode. Therefore, the most important task for higher vocational medical professional teachers is to be willing to use artificial intelligence technology to innovate teaching modes, give full play to the advantages of modern technology, and continuously enhance the attractiveness of teaching classrooms [9]. In the process of classroom teaching, teachers can use artificial intelligence learning analysis technology to record students' complete learning behaviors, including course participation, homework completion, and exercise accuracy, and generate personalized learning plans for each student. The learning plans are continuously adjusted according to the learning effect of each stage to form dynamic teaching guidance, thereby realizing precision teaching and laying a solid foundation for students to improve their innovative abilities in the future. In addition, teachers can also introduce project-based teaching, allowing students to conduct in-depth analysis and practice through actual medical cases, thereby continuously enhancing their practical abilities and innovative awareness [10]. For example, teachers can use actual intelligent medical projects as guidance, and let students use relevant technologies to develop simple disease prediction models or design intelligent health monitoring systems for a specific disease. After assigning the corresponding project tasks, teachers can organize students into corresponding project teams. Teachers can demonstrate various processes from project demand analysis to scheme design for each project team, so that students will not deviate from the main direction during the self-design process. The final technology implementation and result presentation are also very important links. Teachers need to give full play to their role as guides, provide certain professional guidance in these two links, and generate special project completion reports for students combined with artificial intelligence technology, enabling them to recognize their own strengths and weaknesses. During the project implementation process, students can not only integrate the medical knowledge and artificial intelligence technology they have learned in class, but also deeply understand the importance of integrating knowledge and technical practice in actual work. At the same time, they can also imperceptibly exercise their collaboration skills, communication skills, and problem-solving abilities [11]. In the teaching process, teachers can also consciously encourage students to participate in various discipline competitions and innovation and entrepreneurship projects related to intelligent medical care. Such competitions and activities, which are more closely connected with society, can help students fully improve their comprehensive abilities, including the ability to apply new technologies, knowledge transformation ability, and innovative ability. These abilities can effectively help them solve various problems encountered in their future work, thereby continuously improving students' internal competitiveness in the era of artificial intelligence.

3.3. Building online platforms to promote personalized teaching

The successful construction of online teaching platforms is also inseparable from the support of artificial intelligence (AI) technology. Through big data analysis systems, teachers can real-time track students' learning progress and actual learning status. With the assistance of this technology, they can identify students' learning difficulties, adjust subsequent teaching methods and tutoring strategies, and at the same time provide stronger support for the personalized development of medical professional teaching in higher vocational colleges [12].

Students can complete medical and pharmaceutical knowledge consolidation and practical exercises, matching teaching materials on the online teaching platform. The teaching system then conducts an in-depth analysis of students' exercise results using intelligent algorithms and machine learning algorithms, and generates personalized learning reports. These reports cover aspects such as students' weak areas, the degree of knowledge mastery, and learning habits. Such reports not only help teachers analyze the effectiveness of their own teaching methods but also provide strong guidance for subsequent teaching. After students complete the exercises, teachers can also selectively push practical case exercises through the teaching platform—focusing on the same theme, covering similar types of knowledge tests, or involving technical application. Combined with simple virtual technology, these exercises help enhance students' practical operation capabilities. Meanwhile, students can independently choose the skills and solutions to apply during the process, which improves the personalization of their practice. In addition, the online teaching platform can be equipped with built-in medical application cases of various natures and basic inspection and tracking functions for students. This provides students with more extended practice opportunities, ensuring the effectiveness and timeliness of professional teaching. Through this approach, each student can adapt to different AI technologies at a pace suitable for themselves. Moreover, this personalized learning method enables them to steadily improve their autonomous learning abilities, ultimately achieving an all-around enhancement of comprehensive quality.

4. Research on AI-driven innovation in teaching models and methods

4.1. Establishing an intelligent practical training system integrating virtual and physical elements

Against the backdrop of AI, virtual simulation technology can be further introduced in the process of teaching reform for medical majors. By simulating real work scenarios, this technology helps break through the bottlenecks of traditional practical training. For example, some colleges and universities build relevant virtual simulation research laboratories based on the existing National Center for Drug Safety Evaluation, providing students with venues to truly familiarize themselves with clinical drug experiments. Through this approach, students can also gain a preliminary understanding of real work processes and continuously improve their ability to solve practical problems through repeated practice [13].

4.2. Personalized learning and intelligent evaluation systems

The AI-based "adaptive learning system" is completely changing the "one-size-fits-all" model of traditional medical education. The Guidelines for the Application of Artificial Intelligence in Vocational Colleges issued by the Ministry of Education clearly put forward requirements for "personalized learning and skill training" and advocate the use of intelligent learning support platforms, learning situation analysis systems, and other tools to support students' personalized learning [14]. Under the background of the Ministry of Education's "Golden Course" construction initiative, the online courses offered by many schools have introduced the "AI teaching assistant personalized customization" system. This system can assign an assistant robot to each course, using AI technology to provide students with supportive learning services such as real-time Q&A, learning guidance, resource recommendation, and learning reminders [15].

4.3. Multi-dimensional literacy evaluation model

Against the backdrop of artificial intelligence (AI), the evaluation of medical and pharmaceutical talents needs

to go beyond the traditional knowledge assessment model and establish a multi-dimensional literacy evaluation system. The Informatization Teaching Guidance Committee for Vocational Colleges under the Ministry of Education released the Guidelines for the Application of Artificial Intelligence in Vocational Colleges, which requires vocational colleges to "join hands with industry enterprises, professional guidance committees, and other parties in collaborative cooperation to jointly promote the all-round improvement of students' AI literacy and professional capabilities." For instance, a certain medical university has developed a "dual-alignment, five-dimensional, and diversified" evaluation model to conduct a unified assessment of students' abilities in five dimensions: professional competence, experimental skills, comprehensive pharmaceutical thinking, innovative ability, and innovative practice. Corresponding learning pathways and guidance are also provided based on the evaluation results. Meanwhile, by leveraging advanced science and technology, it is also possible to develop evaluation tools of different levels through AI literacy evaluation systems, such as dynamic competency mapping, thereby realizing the visualized evaluation of students' literacy [16].

5. Conclusion

In summary, with the development of the new era, AI technology has been deeply integrated into the field of education. As a discipline closely linked to various emerging medical and pharmaceutical technologies, the teaching of medical and pharmaceutical majors in higher vocational colleges must keep pace with the changing trends of the times and continuously enhance the application of AI technology in the teaching process. Professional teachers need to constantly adjust their teaching methods and content to optimize the overall teaching process, ensuring that students' learning aligns with the current pace of social development and maximizing the forward-looking nature of medical and pharmaceutical professional classrooms.

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