Application of Smart Classroom in the Teaching of Circulatory System Diseases Course for Clinical Students

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ABSTRACT

With the advancement of information technology, the concept of a smart classroom is being develped and enhanced. A smart classroom possesses the attributes of intelligence, individualization, interaction, distance, and diversification. Currently, the use of smart classroom has been implemented in education, creating a diverse and innovative teaching method that effectively combines the internet and traditional classroom settings. The circulatory system diseases course, a crucial curriculum of the clinical medicine major, focuses on developing students' proficiency in diagnosing and treating circulatory system diseases. Clinical students at a vocational college are required to acquire a substantial amount of knowledge across numerous courses within a limited timeframe. Teachers must utilize information technology tools to improve the teaching process and promote students' comprehension and retention of knowledge. This paper introduces the teaching method of the smart classroom, specifically focusing on the application of the smart classroom in the circulatory system diseases course. The aim is to enhance the effectiveness of teaching by considering the features and development direction of clinical students.

Keywords: Smart classroom, Circulatory diseases course, Cardiovascular diseases, Innovative teaching mode, Information technology.

1. INTRODUCTION

Given that the diagnosis and treatment of circulatory diseases are complex, the circulatory diseases course is usually considered one of the most challenging courses in clinical medicine. Moreover, the circulatory diseases course is an essential part of the China medical license examination, demanding that students possess comprehensive application skills. Medical college clinical students face limited learning time, a wide variety of courses, and onerous tasks, hence rendering the efficacy of traditional teaching methods unsatisfactory. The smart classroom is an innovative teaching method that has emerged due to the rapid advancement of information technology. The platform collects abundant teaching materials that possess the features of openness and intelligence, resulting in a more lively educational environment compared to a traditional classroom [1]. With the continuous advancement of teaching reform, the implementation of smart classroom has successfully incorporated advanced 5G internet technology into the educational setting, resulting in greater convenience in accessing teaching resources and a more diverse educational mode. Currently, the integration of smart classroom and certain medical courses has certain benefits. However, there remains a lack of studies that are concentrated on the blend of smart classroom and circulatory disease courses. This research examines the use of smart classroom in the teaching of circulatory diseases and evaluates the merits and drawbacks of information technology-based teaching methods, aiming to provide novel ways for teaching circulatory diseases.

2. THE DEVELOPMENT OF SMART CLASSROOM

Nowadays, the progress of information technology has led to the rise and development of teaching methods that are based on it, offering an exciting new direction for contemporary education. In 2020, the Ministry of Education announced the "Digital Campus Standards for Vocational Colleges," which highlighted the need to move away from superficial teaching modes that focus purely on indoctrination and simple training. Instead, the emphasis should be on guiding students on how to enhance their proficiency in comprehensive learning, such as exploring, collaborating, and resolving issues related to the core areas of their curriculum. To optimize teaching, we must utilize the potential of the Internet, big data, and artificial intelligence technologies to establish an online learning platform, thereby extending the boundaries of time and space for education. This creates a teaching environment that combines virtual and real-world components, facilitating efficient classrooms with various interactions and the fusion of sense and reality. Consequently, it encourages the seamless integration of information technology and curriculum. Additionally, it emphasizes four teaching modes: the blended teaching mode that combines online and offline approaches; the task-oriented teaching mode that integrates "knowledge point + skill point + information technology"; the work process-oriented informationized teaching mode; and the project-driven informationized learning mode [2]. In 2023, the issue of teacher digital literacy will give a more profound description of teachers' literacy. Teachers should make proper use of digital technology to acquire, process, use, manage, and evaluate digital information and resources; discover, analyze, and solve educational problems; optimize, innovate, and transform educational and teaching activities. Promote deep integration and application innovation for digital technology, education, and teaching. "Internet + education" does not simply combine the internet with education but deeply integrates the Internet, mobile network, and education to optimize teaching methods, promote educational innovation and reform, and enhance the sharing and exchange of educational resources. For the education of medical students, the training goal is not only to require students to master theoretical knowledge but also to have the ability to convert knowledge into practice so as to meet the needs of their jobs in the future. "Internet + education" has

greatly changed educational thinking, structure, and teaching mode. The use of MOOCs, cloud data, micro-videos, e-books, and other resources on the Internet platform can enable students to obtain abundant information, strengthen communication between teachers and students effectively, eliminate some students' timidity or shyness, and enhance the relationship between teachers and students [3]. Once students accept the blended teaching approach that combines online and offline parts, their learning schedule becomes flexible, and their level of learning awareness increases. This type of digitized teaching method facilitates the establishment and upgrading of smart classroom. When compared to conventional teaching approaches, both the teaching competence of teachers and the learning capacity of students can be greatly improved.

3. THE APPLICATION OF SMART CLASSROOM IN TEACHING

Due to the rigid and monotonous nature of traditional teaching methods, many concepts remain a bit abstract, making it challenging for students to achieve the desired learning outcomes. The current benefits of smart classroom in teaching include: completing preparatory tasks before class; displaying micro-videos during class; enhancing students' comprehension of theoretical knowledge by introducing clinical cases and practical exercises; summarizing the main points; and providing practice tasks after class to reinforce knowledge, thereby enhancing the effectiveness of teaching. Currently, the availability of diverse medical software, online courses, and widespread use of internet platforms have made it simple for students to learn using mobile phones or tablet computers. This allows them to study independently at any time and from any location, thereby improving their self-study skills. Teachers and students have the ability to communicate with each other without any limitations using internet platforms after class. Undoubtedly, the use of these network platforms and software is tightly connected to the Internet network. An unstable or collapsed network will significantly hinder the implementation and efficacy of education. With the rapid development of information technology, incorporating 5G technology into smart classroom may effectively address the issue of online classroom congestion and enhance the smoothness of teaching implementation. There are no barriers restraining the connection between professors and students.

Through the use of the highly effective smart classroom, teachers have the ability to access the Super Star learning app, Rain class, and other course platforms. They can go over students' learning progress and feedback, as well as monitor their learning behaviors [4], [5]. Therefore, teachers achieve intelligent teaching by adjusting their teaching plans. Students can only effectively engage in practical training and successfully apply theoretical knowledge if they possess a strong foundation in theory.

4. TRADITIONAL TEACHING CHARACTERISTICS OF CIRCULATORY DISEASES COURSE

Currently, medical college teachers mostly adopt the teaching method of integrating information about human organs and systematic diseases. This involves acquiring knowledge about each significant body system separately rather than following the conventional approach of examining the entire system as a whole. The medical curriculum has been progressively more extensive and meticulous since the classification of systemic diseases. Among the several courses, the circulatory diseases curriculum holds significant importance for clinical students, although it is known to be challenging to master [6]. The circulatory diseases course focuses on prevalent and often encountered diseases affecting the circulatory system, including coronary atherosclerotic heart disease, arrhythmia, hypertension, heart failure, and valvular heart diseases. Medical students should acquire proficiency in the typical clinical manifestations and therapeutic principles of these diseases. So, explaining each illness in a clear way to help students understand and remember it, along with training them the clinical reasoning abilities they need to accurately evaluate problems, have become very important parts of teaching. The teaching process of the circulatory diseases course comprises two components: a theoretical course and a practical course. The theoretical course aims to clarify the key concepts and principles, while the practical course aims to strengthen students' skills in diagnosing and analyzing circulatory disorders and help them use the theoretical knowledge in practical scenarios.

Traditionally, students gain knowledge about cardiovascular diseases through passive learning, as teachers provide explanations during lessons. The profusion of information points poses challenges for students in terms of comprehension and retention. The early learning situation clearly reveals that students are unable to effectively utilize their knowledge to address difficulties. It can be difficult to identify pertinent hints, especially when analyzing clinical cases. Nevertheless, the main objective of the practical training course is to offer students the opportunity to put their operational competence into practice. For this, students must become proficient in fundamental abilities like interpreting an ECG, analyzing clinical cases, and performing a heart physical examination. Additionally, the procedures mentioned above constitute the majority of the skills for the China Medical Licensing Examination, and students are required to achieve mastery in them. In a traditional practical course, the teacher primarily displays each step, following which students independently practice. During this period, the teacher may provide guidance and correction for the students' actions. Certain students lack familiarity with the course content due to the difficulty of memorizing intricate procedures within a limited time frame. They consistently disregard the specifics and become confused during practice, resulting in difficulty completing the operation steps smoothly. They are in a state of passive learning in the teaching process. A minority of students refrain from presenting themselves in front of teachers and classmates due to their shy personalities or fear of making mistakes, hence impeding the efficacy of classroom practices. The procedure of an electrocardiogram is kind of simple, and students can gain skills through practice. However, the interpretation of electrocardiogram results is notably complex. The concept of ECG, its typical graphic features, and the related abnormal changes associated with diseases are always abstract. As a result, they are unable to independently analyze electrocardiograms. Teachers face difficulties with effectively conveying a desired teaching result with mere explanation, and correctly assessing pupils' level of mastery in ECG is unattainable. Hence, the conventional teaching approach in the circulatory diseases course lacks lively and interesting designs and fails to integrate with the clinical setting, thereby requiring a greater level of student initiative. Students possess a lacking sense of the learning experience, making it arduous to attain satisfactory outcomes.

5. APPLICATION OF SMART CLASSROOM IN THE TEACHING OF CIRCULATORY DISEASES COURSE

The course on circulatory diseases encompasses both theoretical knowledge and practical operations. The former emphasizes the introduction of key concepts, while the latter prioritizes the development of practical skills. The smart classroom is created by combining online teaching resources and traditional classroom settings, utilizing state-of-the-art information technology and equipment, in order to present an innovative teaching approach aimed at circulatory diseases. [7]. Take a typical instance, such as an acute myocardial infarction: (1) Prior to the start of class, the teacher can utilize network platforms, such as Smart Vocational Education, Super Star Learning App, and Rain Classrooms, to upload a video on acute myocardial infarction. This will enable students to quickly understand the clinical manifestations of acute myocardial infarction and analyze the risk factors associated with it. The teacher assigns preview assignments and requires students to submit their responses by logging into the online platform. (2) During class, students collaborate to submit homework, examine the clinical signs of a clinical case from a video, and discuss potential treatment strategies. The teacher then provides an evaluation. The virtual simulation system, often known as VR/AR technology, is employed to immerse students in a clinical environment that closely replicates real-life scenarios. Students acquire a grasp on patient symptoms through interactive engagement with virtual patients in a simulated ward and subsequently execute the appropriate treatment. The automated system may assess the integrity of the operational procedures and the accuracy of the specific details and present the scoring criteria and deduction points. Furthermore, teachers ask questions on the internet platform by utilizing the real-time and efficient features of smart classroom. For instance, they may ask about the high-risk factors associated with patients who have experienced acute myocardial infarction. How are acute myocardial infarction and angina different? What does secondary prevention of coronary heart disease include? Use mobile applications to draw lots or answer rapidly to help students think. Extra points are given to students who participate in class and understand the contents well in order to get them more excited about learning. (3) After the class, students collaborate in groups to create propaganda materials aimed at promoting awareness of acute myocardial infarction, which they then upload to an internet platform. Teachers evaluate the groups after they have assessed one another. In order to judge the effect of teaching, teachers utilize the online resource library to allocate assignments for practice after the completion of a class session. The class scores are taken into account in the calculation of normal grades, and the best scientific popularization propaganda group is chosen to award additional points. The teacher established an electronic questionnaire survey platform to gather students' feedback on the classroom. Additionally, the teacher gave details online regarding the particulars of diagnosing and treating acute myocardial infarction. Students are invited to answer questions as a means of motivating them to engage in review. The implementation of smart classroom can enhance students' immersion in clinical scenarios, facilitating their comprehension and mastery of operational aspects while also boosting their engagement and learning efficiency. Teachers utilize artificial intelligence technology to extract network data in order to promptly comprehend students' learning progress and practice situations. The interaction is improved, resulting in a stronger bond and trust between teacher and student.

While the implementation of smart classroom has facilitated the development and advancement of methods for teaching, there are still unresolved issues that require attention. The smart classroom necessitates advanced information technology and the ongoing enhancement of both software and hardware infrastructure [8]. Schools must gradually strengthen the integration of information technology and curriculum, necessitating more investment in advanced internet equipment and information teaching equipment. And it is imperative to foster the development of information professionals. Furthermore, because the smart classroom includes a variety of informational teaching modes, teachers must consider the most appropriate teaching resources in order to achieve the best teaching effect. According to the demands outlined in the China medical licensing examination, teachers can enhance the teaching resources for the circulatory diseases course by creating micro-videos, updating the online question bank, and improving the virtual simulation system. This will effectively meet the needs of clinical students. In this study, we solely focus on discussing the implementation of smart classroom technology in the context of the circulatory disease

course. Actually, it is worth discussing the potential application of smart classroom in courses related to other organs and systematic disease courses. Finally, the essential professional attributes that clinicians should possess include exemplary medical ethics and a diligent work ethic. Teachers should subtly incorporate pertinent ideological and political elements into their teaching methods, enabling students to grasp the fundamental qualities and responsibilities expected of medical professionals.

6. CONCLUSION

The smart classroom is a result of the successful integration of state-of-the-art information technology and education. It is equipped with modern hardware and technology, as well as a wide range of educational resources, surpassing those found in traditional classrooms. The smart classroom uses virtual simulation technology, or VR/AR technology, to replicate the attributes of a clinical setting. This allows students to engage in immersive learning experiences, thereby enhancing the effectiveness of learning. Simultaneously, implementing a teaching mode for the circulatory disease practical course in a smart classroom can transform monotonous and abstract topics into lively and attractive content. This approach will boost students' enthusiasm and active involvement, promote greater teacher-student interaction, and create a relaxed learning environment. The utilization of smart classroom is crucial for the successful integration of clinical courses and has significant potential for the application of other medical courses. This new method of teaching is beneficial for supporting the reform and advancement of medical education.

AUTHORS' CONTRIBUTIONS

X.Z. Conceptualization, Writing original Draft, Editing draft, Funding acquisition. W.W. Validation, Resources. X.N. Supervision, Writing review. All authors have read and approved the final version of the manuscript.

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