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Research on Online Teaching Reform of "Parasite Inspection" from the Perspective of Digital Education

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Abstract: In this modern era, with the rise of "Internet + education", colleges and universities have actively responded by using information technology to improve teaching models, introducing platforms such as Chaoxing Learning Pass, Rain Classroom, and MOOCs to carry out online teaching. A new online teaching model for the "Parasite Inspection" course from the perspective of digital education has been initially explored, which has improved the teaching quality of the course. Based on this, this paper will outline the "Parasite Inspection" course from the perspective of digital education and its current teaching situation, and discuss the promotion strategies for the online teaching reform of the "Parasite Inspection" course under the perspective of digital education.
Keywords: Digital education; "Parasite Inspection" course; Practical teaching

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1. Introduction

"Parasite Inspection" is one of the core professional courses for medical laboratory majors. By exploring the strategies for the online teaching reform of "Parasite Inspection", this paper aims to provide practical cases and reference for the online teaching reform of other medical courses, so as to promote the digital transformation and development in the field of medical education and improve the overall quality and level of medical education.

2. Overview of the course "Parasitology Inspection" from the perspective of digital education

2.1. Characteristics of the course "Parasitology Inspection"

The course "Parasitology Inspection" is characterized by strong interdisciplinary integration, high requirements for academic practical operation capabilities, and an emphasis on the close integration of knowledge updating

and clinical application [1]. It involves multiple disciplinary fields such as parasitology, microbiology, pathology, and clinical laboratory medicine. The teaching content is based on the biological characteristics of parasites, such as their morphological structure, life cycle, and pathogenic mechanism, combined with microbiological inspection techniques and clinical medical knowledge to comprehensively judge the diseases caused by parasitic infections. Meanwhile, the course requires students to master various techniques and methods of parasitology inspection proficiently. For example, during the course, students should learn to use different methods such as direct smear method, saturated salt water flotation method, and modified Kato method to separate and identify parasite eggs or worms from fecal samples, which places extremely high demands on students' practical ability and operational standardization. In addition, with the continuous development of social environment and science and technology, the epidemic characteristics, diagnostic techniques, and prevention and control strategies of parasitic diseases are constantly updated and changed. Therefore, teachers should continuously integrate new theories, cases, and technologies into teaching, such as new cases of parasitic diseases, new epidemic trends, and new inspection technologies and diagnostic methods.

2.2. Impact of digital education on the teaching of "Parasitology Inspection"

Digital education has brought rich teaching resources to the course "Parasitology Inspection". Students can watch and learn a large number of high-quality online courses on Internet platforms. For instance, MOOC websites gather "Parasitology Inspection" course videos from well-known universities at home and abroad. By watching lectures by famous teachers, students can not only break the time and space limitations of traditional course learning but also further broaden their disciplinary horizons [2]. At the same time, digital education also includes virtual laboratories that provide immersive learning experiences. In virtual laboratories, students can simulate the operation of many complex experiments that cannot be carried out in offline experimental teaching. For example, they can simulate the entire process of collecting, and process fecal samples and observing them under a microscope. This not only solves the problem of limited specimens in offline experimental teaching but also allows students to practice repeatedly, thereby deepening their understanding and mastery of experimental operation steps. With the vigorous development and wide application of digital education, the flipped classroom has become one of the most popular teaching modes for the "Parasitology Inspection" course among teachers and students. In this mode, teachers upload video micro-lectures and academic literature to the online teaching platform for students to preview independently before class. Class time is more used for teacher-student interaction, group discussions, and answering doubts. After class, teachers can also release group project tasks and homework on the online platform, making the originally boring course more vivid and interesting, thus stimulating students' learning enthusiasm and initiative.

3. Current situation of online teaching in the course "Parasitology Inspection"

3.1. Teaching resources and platforms are increasingly abundant

Currently, there are many educational software available in the market, such as Chaoxing Learning Pass, Rain Classroom, and China University MOOC, which are all used in the "Parasitology Inspection" course. Among them, Chaoxing Learning Pass is deeply loved by teachers and students for its huge resource library and simple operation. Teachers can upload teaching materials such as PPTs, videos, and documents on Chaoxing Learning Pass for students to study at any time [3]. At the same time, Chaoxing Learning Pass also includes functions such as online discussions, group assignments, and online quizzes, which help to increase the frequency of interaction between teachers and students and improve students' participation in the course. A significant feature

of Rain Classroom is its good connection with WeChat. Students do not need to install other apps and can complete classroom interactions through WeChat. Teachers can quickly grasp students' real-time status with the help of functions like real-time bullet screens and online answering in Rain Classroom, and then adjust the teaching rhythm appropriately. China University MOOC, on the other hand, encompasses high-quality course resources from many universities. The "Parasitology Inspection" course videos taught by different teachers have, to a certain extent, met the personalized learning needs of different students.

3.2. Teaching modes and methods are constantly innovated

In actual teaching, the online teaching of the "Parasitology Inspection" course includes various teaching modes and methods. The lecture-based mode is dominated by teachers' teaching, where course knowledge points are explained in the form of recorded or live broadcasts. This teaching mode can transmit a large amount of knowledge information in a short time, enabling students to understand and master basic theories and principles. When explaining basic concepts such as the classification and life cycle of parasites to students, teachers can adopt the lecture-based teaching method to help students have a complete and systematic understanding of this aspect of knowledge. The inquiry-based mode centers on students, allowing them to discover and solve problems, so as to cultivate their self-learning ability and innovative thinking. Teachers put forward some heuristic questions, such as: "How to use modern molecular biology technology to improve the diagnostic accuracy of parasitic diseases?". Students are encouraged to conduct in-depth discussions and find answers through methods like consulting materials and online discussions [4]. The discussion-based teaching mode emphasizes communication and interaction among students. Through online forums, students can discuss a specific topic, express their views and opinions, and jointly promote the popularization of knowledge and the collision of ideas. When learning about the prevention and treatment of parasitic diseases, teachers can organize students to discuss in groups the advantages and disadvantages of various prevention and treatment methods, as well as whether they can be truly applied in real life, so as to stimulate students' independent thinking and enthusiastic discussions.

3.3. Learning evaluation and feedback need to be improved

Compared with the traditional classroom teaching mode, online teaching has made the evaluation methods of the "Parasitology Inspection" course more diversified. Online teaching platforms can record students' learning data, including but not limited to learning duration, homework completion, and online test scores. Some platforms use artificial intelligence technology to realize real-time correction of students' homework and quizzes, and can analyze students' homework or quizzes, feeding back to students in a timely manner the weak links in their course learning. However, the current learning evaluation system is still imperfect. Some teachers pay too much attention to students' online learning data, ignoring the evaluation of students' learning attitudes and collaborative abilities [5]. In terms of summative evaluation, online tests are prone to cheating and cannot well test students' experimental abilities and the literacy of integrating theory with practice. In addition, the lack of timely feedback on evaluation results is also an important influencing factor in online teaching evaluation. Delayed feedback will prevent students from quickly finding suitable learning methods and teachers from adjusting teaching strategies in a timely manner.

4. Improvement strategies for online teaching reform of the course "Parasite Inspection" from the perspective of digital education

4.1. Strengthening the construction of teaching resources

With the rapid development of internet technology, students' demands for teaching resources have become increasingly diversified and personalized. Strengthening the construction of teaching resources has thus become an important way to improve teaching quality. It is crucial to build a digital specimen library to enrich teaching content. Colleges and universities, together with teachers, should collect, sort out, and process various parasite specimens using digital technologies to establish a specimen library containing high-resolution photos, 3D models, and video materials of various common parasites at all their growth stages (such as eggs, larvae, and adults). The latest scanning and imaging technologies should be applied to scan all parasite specimens for high-quality image data, and 3D modeling software should be used to convert 2D images into realistic 3D models, enabling students to explore the external structure of parasites from various angles [6]. This not only alleviates the problems in traditional teaching modes, such as insufficient physical specimens, inability to preserve them for a long time, and limited access, but also enhances students' understanding and recognition of parasites. When teaching about plasmodium, for example, students can clearly observe all parts of plasmodium at various growth stages (including trophozoites, schizonts, and gametocytes) in red blood cells through the 3D models in the specimen library, facilitating a deeper understanding of the plasmodium life cycle and the principles of the disease.

Developing high-quality courses is an effective measure to improve the teaching quality of "Parasite Inspection". Colleges and universities, along with teachers, should coordinate the school's characteristic and high-quality resources, and work with industry experts and renowned teachers to develop model "golden courses". A high-quality golden course should feature scientifically accurate knowledge points, advanced educational concepts, diversified teaching methods, and rich teaching resources [7]. In terms of course teaching, teachers should closely integrate cutting-edge academic developments and clinical practices, continuously update the knowledge system, and ensure that the course content is novel and practical.

4.2. Promoting innovation in teaching modes

Teachers can introduce Virtual Reality (VR) and Augmented Reality (AR) technologies into the online teaching of "Parasite Inspection". VR technology can be used to build highly simulated experimental scenarios for parasite inspection, allowing students to simulate real experimental situations, operate virtual instruments freely in the virtual laboratory, and complete tasks such as fecal specimen processing and microscope observation [8]. For instance, when learning about schistosome eggs, students can use VR devices to observe the three-dimensional structure and subtle characteristics of the eggs from a 360-degree perspective, intuitively perceive their morphological differences, and deepen their understanding and memory of the corresponding theoretical knowledge. AR technology, on the other hand, can integrate virtual parasite models with real-world scenes. Both in class and after class, students can scan relevant images with their mobile phones or tablets and view dynamic demonstrations of parasites' growth processes and pathogenic mechanisms on the screen. For example, when students scan an image of the human digestive system, AR technology can visually and clearly display the parasitic process and migration path of Ascaris lumbricoides in the intestines. The application of these two emerging technologies can significantly enhance students' interest and participation in the "Parasite Inspection" course, effectively addressing the issue of insufficient learning experience in traditional offline practical teaching.

In addition, teachers should introduce intelligent learning assistants to ensure that students' doubts and

questions during online learning can be answered in a timely manner. For example, regarding common questions such as the operational key points of parasite inspection techniques and the applicable scope of different inspection methods, teachers used to repeatedly answer them for different students in offline settings [9]. With intelligent learning assistants, however, students can ask questions anytime and anywhere, which greatly reduces the pressure on teachers to answer questions and allows them to focus more energy on lesson preparation and innovating teaching modes.

4.3. Improving the teaching evaluation system

Traditional teaching evaluation overemphasizes scores from theoretical exams, which can hardly meet the evaluation requirements of online teaching for the Parasite Inspection course. To improve the course's teaching evaluation system, teachers should establish multi-dimensional evaluation criteria to assess students' knowledge, skills, and literacy from various perspectives. In terms of knowledge evaluation, apart from online theoretical exams, knowledge mapping can be used to analyze whether students have a good grasp of parasite inspection knowledge.

Information-based methods can generate correlation diagrams of students' understanding of parasite life cycles, pathogenic mechanisms, and other content to evaluate the establishment of their knowledge structure [10]. For skill evaluation, virtual simulation experiments and practical operation methods can be adopted to quantitatively assess students' abilities in specimen sampling, microscope operation, and application of detection technologies. For example, in virtual simulation experiments, records are kept on standardized actions during execution, time consumption, and result accuracy. When conducting practical experiments, strict standards are formulated, and scores are assigned based on operational steps, operational safety, and the quality of experiment reports, among other factors, to calculate the total evaluation score. In addition, evaluation content should also cover literacy indicators such as learning attitude, teamwork, and innovative thinking. Indicators like online discussion activity, the completion degree of group project tasks, and innovative experimental schemes are used to evaluate students' disciplinary literacy, comprehensively reflecting their overall quality.

5. Conclusion

In summary, the teaching of the "Parasite Inspection" course needs to keep pace with the development trends of education in the new era and the cutting-edge dynamics of the discipline. With students at the center, it should innovatively apply online teaching to improve teaching efficiency. Through innovative reforms in teaching resources, teaching models, and teaching evaluation, students' autonomous learning ability and learning effects can be further enhanced, cultivating more high-quality inspection professionals.

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