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MOOC and Virtual Simulation Experiment in Experimental Teaching of Animal Chinese Medicine Analysis

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Abstract: Chinese medicine analysis experimental science is a comprehensive experimental course that can cultivate the preliminary clinical hands-on ability of medical students. Because of its high requirements on students' basic knowledge and comprehensive ability to apply knowledge, teaching is difficult and the teaching effect is general. The purpose of this paper is to apply the two advanced teaching methods such as MOOC and virtual simulation experiment technology that are emerging today to the analytical teaching of animal drugs, to understand the application status of analysis and virtual simulation experiment teaching of animal drugs in medical Functional Experiment Course and analyze its advantages and disadvantages, which can provide reference for further development of functional virtual simulation experiment teaching. This paper uses the MOOC teaching method, a new network-based teaching model, to study the experimental teaching of animal Chinese medicine analysis and the construction of virtual simulation experiment teaching system under the new situation. Firstly, analyzed the advantages in experimental teaching of animal Chinese medicine analysis under virtual simulation experiment. Secondly, it puts forward suggestions for constructing the virtual simulation experiment teaching system of Chinese medicine. At the same time, it discusses the advantages of the combination of MOOC and virtual simulation experiment technology, as well as the status quo of drug analysis teaching, opportunities and reforms under the new situation. Therefore, it can be concluded that by using MOOC and virtual simulation experiments can break through the limitations of traditional teaching and improve teaching. This paper apply the MOOC and virtual simulation experiment to the experimental teaching of animal Chinese medicine analysis, can not only improve the teaching of teachers, but also cultivate the practical ability and thinking innovation ability of medical students in clinical practice. With the advantages of MOOC and virtual simulation experiments, it provides better opportunities and challenges for the analysis teaching of animal drug.

1. Introduction

MOOCS, referred to as MOOCS is a large-scale open online course, which is a form of online course development that has emerged in recent years [1]. The essence of MOOC is developed from online courses, video courses and Internet-based communication platforms, emphasizing scale and openness [2]. Virtual simulation experiment technology is an emerging electronic experiment platform that has emerged with the rapid development of science and technology and network technology. It can realistically simulate real experimental scenes and perform experimental operations on a computer [3-5]. Drug analysis is a discipline that uses analytical and measurement methods to develop drug analysis methods, study drug quality patterns, and conduct comprehensive testing and control of drugs. The joint application of MOOC and virtual simulation experiments realizes the complementarity of superior resources [6]. MOOC uses highly attractive videos and a wealth of network resources to make the boring knowledge points vivid, easy to understand, and very attractive. The virtual simulation experiment uses computer, multimedia, virtual reality and other advanced technology to transfer the actual experiment to the computer, which can not only reduce the cost of the investment and maintenance of the experimental equipment, the consumption of reagents and other materials, and alleviate the lack of experimental space. The problem, because of its vivid image, simple operation, safe and reliable, also brings a new experience to students. Virtual simulation experiments can complement and improve the course of organic theory [7]. Most of them can only provide online theoretical courses for students, lack of experimental links, and bring inconvenience to some disciplines combining theory and practice, leading to the loss of students and the decline of learning effects. Therefore, how to conduct experimental teaching in Mu is a big problem before us. The virtual simulation experiment uses virtual reality and computer simulation, multimedia and other modern technologies and interactive modes to simulate the experimental environment and operation objects through virtual height, so that the experimenter can complete all the scheduled experimental projects and meet the requirements of the syllabus. Teaching effects and the goal of talent training [8]. In particular, it can avoid the loss caused by high-risk environment and irreversible operation, and save the cost of large-scale experimental projects with high cost and high consumption. It can be said that the virtual simulation experiment provides an implementation method for the experimental teaching of large-scale online courses, and also provides an effective way for drug analysis experiments in animals. There are some problems in the traditional experimental teaching of animal medicine. For example, when students conduct medical experiments, most of them use the same subject, but this method of experimenting with a single example requires high subject and low repeatability. Another example is that students are not qualified as doctors, and therapeutic experiments in the course of learning violate the laws of practicing physicians, and virtual simulation experiments have effectively solved these problems and have other advantages. In the teaching of Chinese medicine, the use of virtual simulation experiments broke the traditional time and space constraints. With the computer on which the virtual simulation experiment is installed, the lab class is no longer restricted by the curriculum and lab [9-10]. Using the network virtual simulation experiment teaching, students can conduct experimental operations anytime and anywhere, effectively improving the students' experimental skills. In addition, the use of the network information platform enables traditional Chinese medicine virtual simulation experimental teaching resources to be shared throughout the school and also for the society. Online education is not only an effective way to save educational resources, but also beneficial to individualized teaching. It is a way to realize the popularization, modernization and lifelong development of higher medical education.

At present, most medical colleges still use the combination of classroom theory teaching and experimental courses for drug analysis. Some colleges and universities have begun to record and use online courses, but rarely use virtual simulation experiment teaching to assist theoretical teaching. Today, college students are increasingly interested in emerging technologies and methods [11-12]. Computers and mobile phones have become an indispensable tool in their life and learning, and they are skilled in operating various software or mobile applications. However, some teachers still follow the original teaching mode, blindly instilling boring knowledge points into students, and even do not combine life examples, which makes it difficult for students to concentrate in the classroom and it is difficult to achieve good learning results [13]. In addition to theoretical teaching, many of the analysis involving large instruments are not used because of the shortage of funds in schools, and the use of less, so that students do not have their own hands-on opportunities, only imagination or video learning, lack of practice, The students are not in the actual operation, not only the learning effect is not very ideal, the memory time is short, many people are difficult to deal with the test memory, and soon after the test, there is no good teaching effect [14].

For the moment, we should make full use of the advantages of online education and use virtual simulation experimental techniques to provide students with more practical opportunities. This reduces the consumption of resources, reduces the cost of teaching, and also avoids various security risks in the experiment. In the experimental teaching of traditional Chinese medicine, some medical wastes are often generated, which has a great pollution to the environment [15]. The use of MOOC and virtual simulation teaching can effectively avoid this problem, reduce environmental pollution, and achieve green teaching [16]. The use of virtual experiment technology in MOOC and virtual simulation teaching can effectively solve the contradiction between the demand for innovative talents in colleges and universities and the shortage of equipment. Through virtual simulation technology, students can rely on a single computer and a set of virtual simulation software to complete the traditional experiments that require many technical equipment. This broke through the barriers of the classroom and teachers, and the experimental results were optimized [17]. In addition, using virtual simulation experiments, students combine their own interests, compare and screen experimental objects, experimental methods and experimental projects, processes, etc., so that the experimental process can be optimized, which effectively ensures that students can complete experiments independently.

This paper uses the network-based classroom teaching as a new teaching mode. The virtual simulation animal medical analysis experimental teaching under the new situation, the experimental teaching system is constructed. Firstly, the advantages of virtual simulation experiment animal medical analysis experimental teaching are analyzed. The proposal and discussion of constructing the virtual simulation experiment teaching system of traditional Chinese medicine, the combination of class and virtual simulation technology and the advantages of pharmaceutical analysis teaching, reform and opportunities under the new situation. By enriching the content of the virtual experiment project, the 3D virtual experiment is more realistic, and the experimental steps are demonstrated from many aspects and multiple angles. In clinical practice, it is necessary to combine the MOOC and virtual simulation experiments to carry out experimental teaching and learning, but virtual experiments cannot replace actual experimental conditions and environments. The virtual experiment will eventually return to the original real animal experiment to verify.

2. Proposed Method

2.1. MOOC and Animal Chinese Medicine Analysis Experiment Teaching

With the acceleration of the socialization process, the educational approach has also shown a qualitative increase. New forms of teaching, such as online open classes, micro-curriculums, and MOOCs, are emerging as emerging educational technologies. Among them, network technology is one of the most advantageous ways for modern education, and has been widely used in all aspects of teaching. MOOC is a large-scale online open course and a new type of educational learning model. They provide video instruction, in-class or after-school exercises, after-school online tutoring and after-school comprehensive testing, based on a certain amount of time on the web, which is similar to traditional university semester settings. Therefore, the teaching of MOOC is not only the destructive power of modern education, but also the lack of entanglement in the creation of pain education, so that students can fall in love with learning.

The animal experiment is based on the integrated animal physiology, pathophysiology, and pharmacology experimental content of traditional Chinese medicine analysis. The traditional Chinese medicine, the functional three-disciplinary experimental teaching content is organically combined, and the advantaged subject organization and communication resource sharing experiment are fully utilized to establish a Independent courses, the purpose of experimental research is to strengthen the basic experimental skills of medical students, and to develop students' comprehensive analytical skills, problem-solving skills and clinical practice skills. For the traditional animal-based Chinese medicine analysis experiments, it is generally required to support the laboratory and other related environments, but in the teaching, the experimental equipment, drugs and animals cannot meet the requirements required for teaching, resulting in only a small number of students Conduct comprehensive laboratory skills training. It is the emergence of the MOOC and the simulation experiment environment that is effectively alleviated in the absence of laboratory conditions.

The animal Chinese medicine analysis experiment is based on the video of the functional subject. Through the recording of the whole process of the experiment, supplemented by the discussion area of classroom exercises, discussion questions and exclusive knowledge points, the traditional functional experiment teaching can be supplemented. In the traditional functional experiment teaching, supplemented by the synchronous function experiment MOOC online course, students can get online and offline teaching mode training, and also enable students to get theoretical and skill training in advance to improve the success rate of animal experiment operation. And get better training results. For example, in rabbit arterial blood pressure regulation experiments, students are prone to errors during anesthesia and arterial intubation, resulting in anesthesia failure and arterial puncture. However, students can observe and learn the above operations in the early or simultaneous times through the MOOC, master the technical points, improve the rabbit anesthesia success rate and the success rate of arterial intubation.

2.2. The Impact of Virtual Simulation Experiment in Teaching

With the improvement of computer hardware conditions and the development of computer software technology, it can play a huge role in 3D reconstruction technology. The current 3D simulation virtual experiment is widely used in medical teaching and laboratory teaching. The current virtual simulation experiment combines a variety of virtual simulation technologies. There are different virtual experimental environments in the virtual simulation technology, which enables

the students participating in the experiment to randomly select the experimental environment they need. It also allows the experimenter to perform experimental operations in a laboratory condition comparable to the laboratory's real environment.

Virtual simulation animal medical analysis experimental teaching mode is mainly reflected in the full pre-study before the class, so that students gradually master the experimental principles, operating procedures, precautions and so on. Only in the classroom can students have more time and opportunities to interact with other students or teachers. The function of the virtual laboratory system establishes a good platform for teachers and students to flip classes. For example, in exploring drug effects and normal cardiovascular activity regulation experiments, students can self-prepare before class, goals and subjects through virtual experiment systems. , experimental equipment and drug analysis, according to the principles of the experiment to further review the knowledge of the previous knowledge of cardiovascular system biology, help to deepen students' cognitive thinking, further improve the experimental operation ability, students watch experimental operation videos, difficult Some student practice parts, students can simulate every step of the experiment during the simulation experiment, and can actually realize the actual operation in the classroom. The system effectively solves the difficulties of students' pre-class preparation. Because the complexity of the experimental content is more abstract, it is difficult for students to effectively grasp the experimental steps. The incomprehension in the experiment can also be the interaction between the target and the teachers and students. Students' self-learning enthusiasm improves the quality and efficiency of experimental teaching.

Nowadays, how to effectively and effectively add virtual simulation experiments in the experimental teaching process can significantly improve students' enthusiasm for participation and teaching quality through the virtual experimental environment. But whether it can substantially improve the overall quality of education and education progress, after all, the virtual simulation experiment is virtual, it loses the intuitiveness, stimulation and exploration of real things. Functional experimentalism is an experimental discipline that studies living animals. The authenticity of living laboratory animals is an important factor in improving students' enthusiasm for practice. Therefore, in the application of virtual simulation experiments to teaching, students' learning interest and enthusiasm are low. Therefore, the teaching of the application function experiment of the virtual simulation experiment should be improved from the following two aspects: first, enrich the content of the virtual experiment, more realistic three-dimensional virtual experiment, and demonstrate the experimental steps in various aspects and from multiple angles; Virtual simulation experiments combined with animal experiments, virtual cannot replace reality, virtual experiments ultimately require real animal experiments.

In summary, no matter from the development trend of network technology, reforming the needs of traditional basic medical courses, designing and developing network open class quality and simulating virtual experiment and application function laboratory teaching is undoubtedly the hotspot and direction of practical teaching in future higher occupations. Applying MOOC and virtual simulation experiments to functional experiment teaching can lower the threshold of experimental projects, free students from the limitations of equipment and time, obtain more and better experimental projects and teaching content, and improve the quality of practical teaching. In the actual teaching process, how to control the class time ratio of MOOC, virtual simulation experiment and animal experiment, coordinate the relationship between virtual simulation experiment and real experiment, improving the quality of teaching in functional laboratories is the direction of functional laboratory curriculum reform.

2.3. Construction of Virtual Medical Experiment Teaching System of Traditional Chinese Medicine

(1) Establish a virtual simulation experiment teaching system for acupuncture. The acupuncture simulation experiment teaching system can be divided into three modules: 1) Meridian point positioning training module. In the virtual simulation experiment system, the specific positions of various acupuncture point and meridians of the human body, including the functions of acupuncture point and instructions, can be preset. Students can locate acupuncture points in a virtual environment and draw lines along the meridians. Students will be recorded and graded. In this way, students can learn and memorize the knowledge related to acupuncture point to a large extent when identifying acupuncture points, and lay a foundation for the study of acupuncture techniques. 2) Acupuncture Training Module: Students can use the mouse and keyboard to perform acupuncture training on the 3D human body model. Students can choose the length, direction and depth of the needle. In the process of acupuncture, students can produce skin rotation and depression on the human body model, with strong instant vision. 3) Comprehensive example training module. First, students can choose to compile acupuncture cases and then follow the standard procedures of acupuncture for related operations. Second, students identify symptoms and make injections based on their medical history, medical reports, and other information. During the operation, the virtual system can feedback according to the operation effect of the students, and finally achieve the therapeutic effect.

(2) Construct a four-diagnosis simulation experiment teaching system for Chinese medicine. "Look, smell, ask, cut" is the basic skill of Chinese medicine. The traditional teaching method is that teachers teach students the basic theoretical knowledge and practical experience of Chinese medicine. However, this method leads to insufficient systematic learning of theoretical knowledge, which is not conducive to the review of students. Therefore, this problem can be solved by virtual simulation experiments. The use of modern instruments such as inspection instruments and pulse diagnostic instruments to simulate the teaching of four diagnostic methods can effectively regulate the students' operational behavior and improve their diagnostic ability. The four-diagnosis simulation experiment teaching system can be divided into two modules: 1) Basic skill training module. The use of advanced equipment and teaching software, such as color maps, inspection software, tongue diagnosis model, pulse diagnosis instrument, intelligent pulse meter, etc., can reproduce the true clinical and pathological conditions. This can effectively deepen students' understanding of theoretical knowledge and improve students' practical ability. 2) Comprehensive ability training module. Through the establishment of simulated clinics and simulated wards, and through the establishment of standardized patient assessment and evaluation models, simulations of some common diseases, often seeing the disease in clinical practice, so that students' skills to see, smell, ask and cut can be practiced, and TCM diagnosis And the ability to differentiate can be effectively improved.

(3) Establish a Chinese medicine experimental training platform. It is also very important to establish a Chinese medicine experimental training platform. Colleges and universities should establish important plant specimen rooms, Chinese medicine botanical gardens and Chinese medicine processing workshops according to actual conditions. The traditional Chinese medicine specimen room not only displays various Chinese medicine specimens, but also produces electronic sandboxes and electronic learning systems in the main areas of traditional Chinese medicine. In addition, in order to facilitate students to learn herbal knowledge, you can set the corresponding QR code on each plant of the Chinese Medicine Botanical Garden. Students only need to scan the code

to understand the shape, characteristics, life characteristics and drug function of the plant. Actively carry out Chinese medicine processing simulation workshops, using Chinese medicine to produce excellent resources courses to achieve online and offline interaction.

3. Experiments

3.1. Data Collection

196 students from 5-8 classes of clinical undergraduates were selected, including 5 classes of clinical medicine and 99 classes of 6 classes as experimental groups. The control group consisted of 97 students in 7 classes and 8 classes. All students were science students, and the general data were not statistically significant (P>0.05).

The questionnaire was used for classroom testing, and the teaching evaluation was carried out from the aspects of group experiment success rate and mixed teaching investigation and analysis.

(1) Student evaluation: The questionnaire survey method is adopted. The main contents include students' attitudes towards "online + offline" mixed teaching and traditional classroom teaching, their ability to accept, their role in their own development and their lack of teaching methods. Questionnaire data were descriptive statistical analysis.

(2) Total score evaluation: After completing the teaching content, the two groups of students will use the same functional laboratory test to evaluate their knowledge. The total score is 100 points, the theory is 70 points, and the PBL is 30 points. 89.5~100 is excellent, 74.5~89.4 is good, 59.5~74.4 is pass, and below 59.5 is fail.

3.2. Experimental Environment

There are 10 modern medical functional laboratories, including 2 virtual laboratories and 8 general laboratories. The virtual laboratory is equipped with 82 computers, a server and a virtual system of vbl-100 simulation laboratory. Among them, the large-scale medical virtual simulation experimental teaching system is connected with INT through the teaching platform of the Educational Administration Department. Students can not only learn functional knowledge in the laboratory, but also read and collect a large number of experimental textbooks through mobile phones at anytime and anywhere. Bl-420 biological signal processing system and medium wave multimedia teaching system were installed in eight common laboratories, which made the experiment more convenient and the experiment results more intuitive and reliable. Data processing software uses SPSS21.0 statistical software to process the data, and secondary analysis of the processed data.

3.3. Experimental Steps

This time, the students are in the study stage of animal traditional Chinese medicine analysis experiment. The experimental group and the control group were taught by the same teachers. The control group was taught by traditional teaching method, while the experimental group was taught by superstar learning platform-Mu class and virtual simulation experiment.

(1) Autonomous Learning Network Platform: Animal Chinese Medicine Analysis and Experiment Teachers spend a lot of time recording and producing videos, including the use of some basic tools and instruments, and finally upload videos, - Mu lessons and virtual simulation experiment courseware and other learning resources of superstar learning platform. Animal

experiments were carried out and 2-3 typical clinical cases were selected. Each class is divided into six groups, and common questions are designed for students to discuss. The experimental group students use the superstar learning platform for online learning activities. Current experiments include measuring arterial blood pressure, measuring ED50, influencing factors of cardiac function, occurrence and treatment of experimental heart failure. This is because these three experiments were carried out on human, mice and toads. The purpose is to cultivate the habits and abilities of students to learn independently. The control group used the traditional way of textbook preparation.

(2) Implement offline teaching: First, test student self-study in the classroom to test the learning effect. In the teaching process of the experimental group, teachers change the traditional inculcation teaching method into the student-centered teaching method, In other words, students use teaching methods, students discuss, teachers and students solve problems together. The control group used the method of teacher's lecture in class to teach students the experimental principle, method, steps and matters needing attention. The experimental operation of the two groups of students was conducted under the correct guidance of the teacher. The teacher discussed and summarized the experimental phenomena, and wrote the experimental report after class.

4. Discussion

4.1. Contrast and Analysis of Student Evaluation

(1) 99 questionnaires were sent out and 97 valid questionnaires were collected in the experimental group, with a recovery rate of 98.00Ic. Students generally believe that mixed teaching is more suitable for them, because functional experimentalism itself involves complex theoretical knowledge, which requires students to complete by hand. Mixed teaching is beneficial for students to master knowledge systematically and cultivate students' ability and consciousness of independent learning. The details are shown in Table 1 and Figure 1:

Table 1. Student evaluation

Project	Sure	Neutral	Against
Whether to accept Teaching Reform	51.34	19.15	19.31
Whether to accept mixed teaching	70.85	14.34	14.81
Whether Reform can Improve Hands-on Ability	74.33	11.30	14.36
Whether Reform can Improve the Success Rate of the Experiment	62.44	12.27	25.29

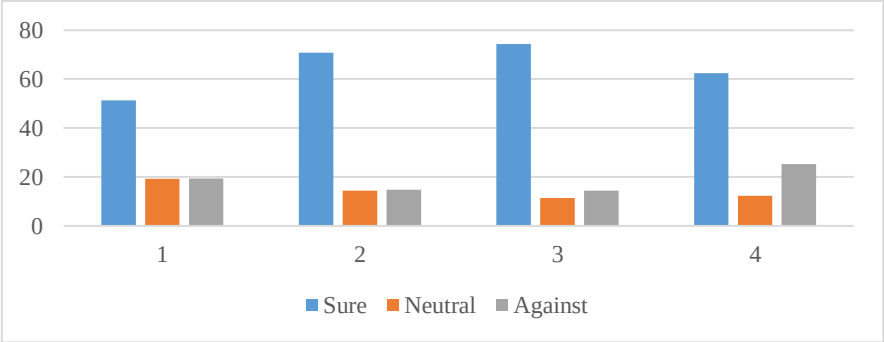

Figure 1. Student evaluation chart

(2) The experimental success rate was calculated by 12 groups of experimental group and 12 groups of control group. The experimental success rate was calculated according to the experimental success rate of each group, as shown in Figure 2:

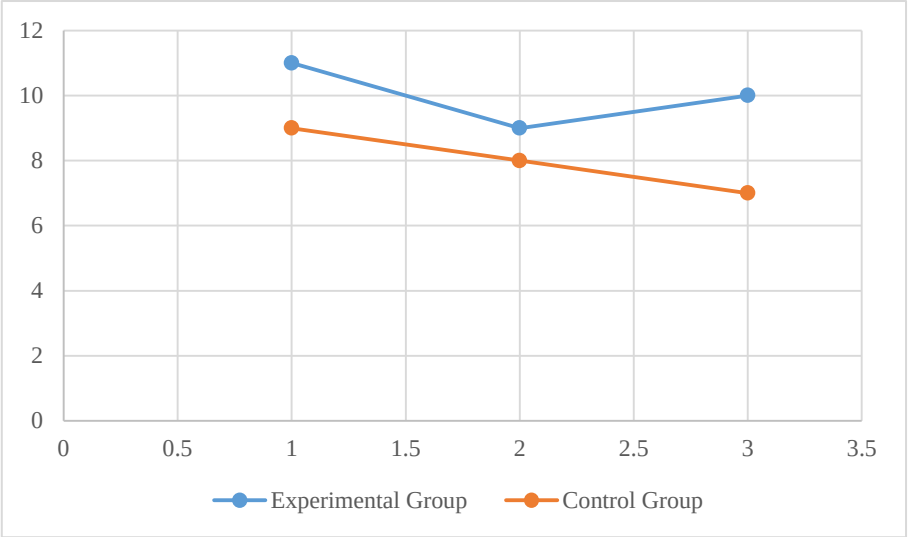

Figure 2. Experimental success index

4.2. Teaching Quality Results and Comparison

(1) The results of the final test results of the students showed that the average score of the experimental group (99 groups) was higher than that of the control group ($P<0.05$). The proportion of excellent students in the experimental group (67.6%) was higher than that in the control group (77 groups, 56.70%) ($P<0.05$), and the proportion of students who failed the test was only 4.00%, which was significantly lower than that of the control group (10.3%, $P<0.05$), Figure 3 shows:

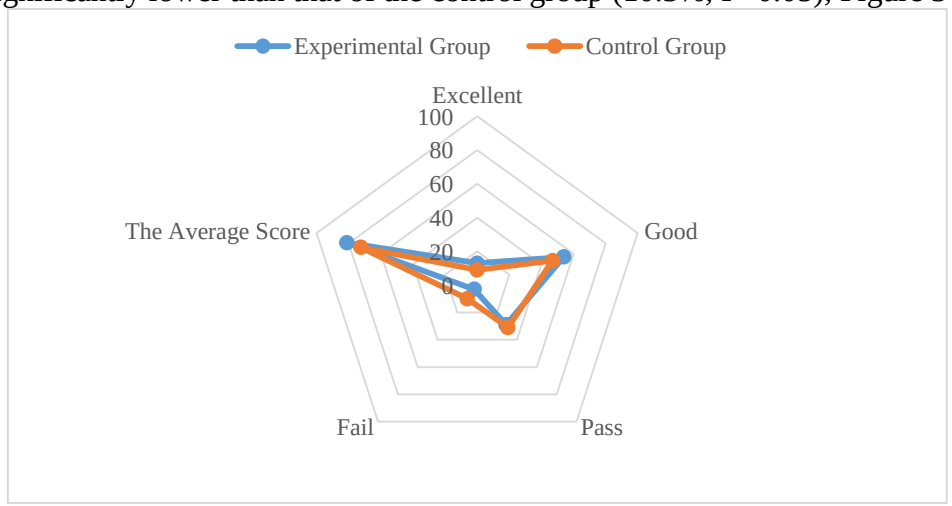

Figure 3. Two groups of students final exam scores

(2) MOOC and virtual simulation experiment teaching is a typical process teaching, the test should focus on process testing and scenario testing. The two stages of design are comprehensive and multi-angle assessments from the aspects of project design innovation ability, comprehensive application of knowledge ability, literature induction and induction ability, hands-on ability,

language expression and writing ability, independent analysis and problem-solving ability. In this experiment, the experimental group members were selected to score the experiment. The scores are shown in Figure 4.

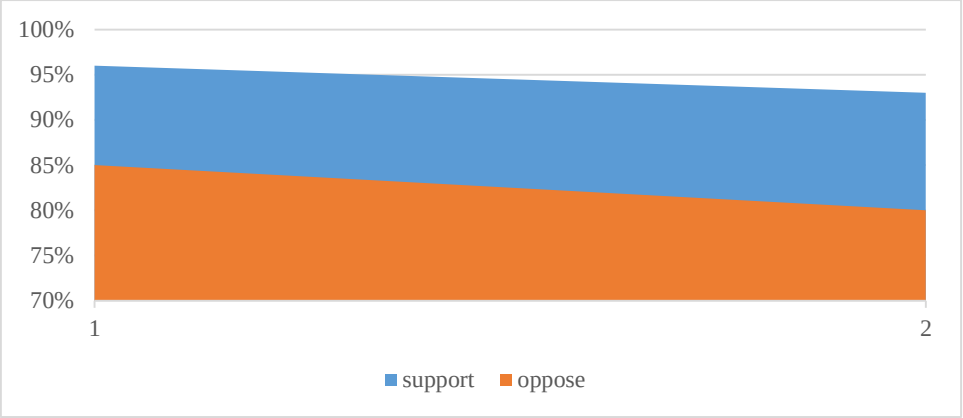

Figure 4. Experimental support rate

5. Conclusion

Through the above experiments, it can be seen that the quality of teaching is not only reflected in the objective academic achievement, but also in the subjective satisfaction of the students in the teaching effect. The feedback from the students plays an important role in improving and improving the quality of teaching. A questionnaire survey on the satisfaction of design experiments for 135 students in clinical medicine. The results show that students are recognized for the experimental teaching methods using the new technology and virtual simulation experiments. 85% of the students believe that the MOOC and virtual simulation experiments are necessary in the analysis of animal Chinese medicine, and the whole process involves the design process. 80% of students believe that they have the basic ability to carry out research and design work, and the satisfaction of the course reaches 96%. It shows that the teaching method of the experiment and teaching of animal Chinese medicine in the virtual simulation experiment is feasible and effective in teaching.

Medical undergraduate students are future doctors. How to better develop students' active learning ability in the basic medical education stage is worthy of attention. How to improve the self-learning ability, clinical diagnosis ability and scientific and technological innovation ability of medical undergraduates is the need of the development of higher medical education, and it is also one of the important issues to be solved urgently. In the function experiment teaching, the experiment focusing on basic skill training is an important way to train students to master basic skills and strengthen theoretical knowledge. Traditional teaching methods are mainly taught by teachers. The teacher first explains the basic principles, methods, steps and precautions of the experiment, then guides the students to conduct experiments, and finally analyzes and summarizes the experimental results. Most of the traditional experimental teaching adopts this method, which has the advantages of large amount of information and emphasis on key points, and has a certain effect on students' in-depth understanding of theoretical knowledge. The disadvantage is that the students' subjective initiative and innovation ability cannot be fully utilized, and students' self-learning ability cannot be improved. Without adequate preparation, it is difficult for students to master complex theoretical knowledge in a limited classroom time. This project has built a superstar teaching platform for online learning, and uses case studies such as case studies offline. This teaching reform takes the "online + offline" mixed teaching mode as the core, and builds a new

teaching mode based on clinical cases and animal experiments. This model provides students with sufficient preparation time, which is conducive to cultivating students' solid theoretical foundation, thus improving the teaching effect of the experimental class, and laying a foundation for cultivating clinical talents with comprehensive application analysis ability and practical operation ability.

MOOC and virtual simulation experiments in the teaching of animal Chinese medicine analysis experimental teaching requires a high-quality teaching team, teachers must do a good job of "online + offline" teaching, with the ability to comprehensively solve problems. In addition, the new teaching methods put forward higher requirements for the evaluation system, especially the formative evaluation, including self-evaluation, mutual evaluation and teacher evaluation. In summary, mixed teaching can give full play to the leading role of teachers, ensure students' subject status, mobilize students' enthusiasm, initiative and creativity, and improve students' ability to use the knowledge they have learned to solve practical problems. Studies have shown that MOOC and virtual simulation experiments are effective in the teaching of animal Chinese medicine analysis experiments, which can significantly stimulate students' interest in learning, cultivate the comprehensive ability of knowledge self-construction, improve information communication and sharing awareness, and improve teaching effects. . In the future work, teachers also need to strengthen teaching reform, accumulate experience and improve teaching results.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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