

## *The Positive Impact and Challenge of Animal Drug Analysis Course in the MOOC Mode*

**Xiuying Wang\***

*School of Economics, Harbin University of Commerce, Harbin, Heilongjiang 150000, China*

*3551811831@qq.com*

*\*corresponding author*

**Keywords:** Animal Drug Analysis, Teaching Form, MOOC Mode, Traditional Teaching Model

**Abstract:** With the further development of pharmaceutical research and the advancement of instrumental determination technology, pharmaceutical analysis is not only the analysis, inspection and control of drug quality, but also its research and teaching contents have been extended to all aspects of pharmaceutical research, and it plays a key role. In this paper, the new situation of the development of animal pharmacy at home and abroad in recent years, the course characteristics and teaching mode of drug analysis are analyzed. The improvement measures were put forward to improve the teaching quality and cultivate competitive talents of animal pharmacy who can promote the healthy development of the animal protection industry. In this paper, through the teaching form of Mu class, teaching the course of animal pharmacy analysis. And from the characteristics of resource sharing, new learning methods of learners, the reform of teaching mode of animal drug analysis, the change of teachers' ideas in the new era, etc, summarizes the positive influence of the teaching mode of Mu Course, and finally analyses the challenges faced by the current construction of Mu Course. In order to promote the promotion of Mu class teaching in the classroom of animal drug analysis. The experiment was designed to compare the teaching results of animal pharmacy analysis under the traditional teaching mode and the Mu-class teaching mode. The experimental results prove that the teaching mode of Mu class has high feasibility in teaching practice. As a supplementary part of traditional teaching, the Mu-class teaching mode exists, combining "self-directed learning" with "self-directed learning" to change the situation of unification of single traditional teaching mode, it is more conducive to students' learning and development.

## 1. Introduction

Pharmaceutical analysis is a professional course of animal pharmacy specialty. Its task is to train students to have the concept of comprehensive drug quality control, to make them competent for the analysis and inspection work in the process of drug research, production, supply and clinical use, and to have the basic thinking and ability to explore and solve the problem of drug quality [1-2]. In order to strengthen the basic quality training of student's innovative ability, we should pay attention to the exploration of teaching materials and teaching methods in pharmaceutical analysis teaching, so as to cultivate the compound talents needed by the society [3-4]. The development of animal pharmacy in foreign countries is earlier and commercialization is more mature. For example, Pfizer and Bayer have their own department of veterinary medicine, which is used to develop and produce veterinary drugs. They have successfully developed a large number of animal-specific drugs according to the characteristics of different animals. Many traditional drugs have brought huge profits to the company after changing dosage forms. The development of veterinary pharmaceuticals in foreign countries is also relatively mature, because each new veterinary drug declaration or new formulation on the market must control the quality of raw materials, intermediates, process, storage, clinical application and other processes. In recent years, due to the progress of instrumental analysis, veterinary drug analysis has also brought rapid development. The establishment of animal pharmacy specialty in China is relatively late, and the start of drug research and development is relatively late. Although in recent years it has developed rapidly, some colleges and universities, scientific research institutes and larger veterinary drug manufacturers have declared new veterinary drugs, but it is still in the imitation stage [5-6]. The ability of animal pharmacy specialty to serve veterinary medicine industry in China is relatively weak. The main reason is that the curriculum system of animal pharmacy specialty in some colleges and universities follows the plan of talent cultivation and does not highlight the characteristics of "medicine", so it is difficult to achieve the anticipated goal of establishing animal pharmacy. In this case, through the teaching reform of pharmaceutical analysis, we can explore a suitable system for the reform of animal pharmacy, and cultivate talents of animal pharmacy suitable for the needs of society.

In order to meet the needs of the society for high-quality innovative talents, the traditional "cramming" teaching mode should be broken in the teaching of drug analysis, and more attention should be paid to the cultivation of students' independent learning ability, practical ability and innovative ability. With the strong support of the Education Department, try to implement reforms in drug analysis teaching, and implement the online sharing of quality courses resources, so that students can learn online, practice online, study and discuss in class, and teach the teaching methods of teachers [7-8]. Students can study the key courses of key institutions free of charge without leaving their homes, appreciate the teaching style of famous teachers, broaden their horizons and cultivate their independent learning ability. In 2012, the most popular words in the education sector were non-make classes. In 2012, it was called "MOOC Year" by Laura Pano, the author of the New York Times. The top universities in the world ranked the top motto resources [9]. As the latest form of online education, MOOC combines social services, online learning, big data analytics and mobile internet to provide users with large-scale free online higher education services and a lively learning experience. The great advantages of MOOC have attracted widespread attention from policy makers, investors and educators, and they have been attracted to the construction of MOOCs [10]. Today, there are three major learning platforms, Coursera, Udacity and Edx, which are responsible for the promotion of the course. The three companies provide modular online materials, play short video clips, conduct interactive Q&A activities, and engage students to discuss and learn through online forums. The actual teaching is outside the video lectures, spanning multiple platforms such as blogs,

websites, and social networks. A large number of rich curriculum resources from world-renowned universities have attracted learners from all over the world to learn online together. Online assisted and distance learning under the guidance of various professional teachers

In this paper, the course of animal pharmacy analysis is taken as the experimental object, and the influence of traditional teaching methods and MOOC mode on teaching results is discussed. The MOOC has a famous teacher effect. Students can make full use of the resources of famous teachers and choose more master classes of animal pharmacy analysis through the MOOC. At the same time, due to the sharing of the MOOC, it is conducive to the unification of teaching, can eliminate the resource differences in animal pharmacy analysis in different regions, and ultimately realize the balanced development of education in China.

## 2. Proposed Method

### 2.1. Animal Drug Analysis

Drugs are substances that prevent, treat, diagnose diseases and help the body to resume normal functions. The quality of drugs directly affects the safety and effectiveness of drugs and the safety of patients. Although medicine is also a commodity, its quality control is much stricter than other commodities because of its particularity. Therefore, we must use various effective means, including physical, chemical biology and microbiology, to ensure, control and improve the quality of drugs in all aspects. Traditional drug analysis methods mostly include chemical methods to analyze drug molecules and control drug quality. However, nowadays, both the analytical field and the analytical technology of drug analysis have been greatly expanded. From static analysis to dynamic analysis, from in vitro analysis to in vivo analysis, from quality analysis to bioactivity analysis, from single technical analysis to combined analysis, from small sample analysis to high-throughput analysis, from manual analysis to computer-aided analysis, so as to make drug analysis a point in the early 20th century. Analytical technology has gradually developed into an increasingly mature science - pharmaceutical analysis. Pharmaceutical analysis adopts the analytical theories and methods of chemistry, physics, mathematics, biology and informatics, and combines modern chemistry, spectroscopy, chromatography and continuous technology to control the quality of research, development, production, and clinical application of chemical drugs, traditional Chinese medicine/natural drugs and biotechnology. Pharmaceutical analysis, as the eye of Pharmaceutical Science research, combs and gradually clarifies the major scientific issues in key directions, forms key technologies and methods, constantly updates concepts, and expands the scope of research. The development of analytical science, computational chemistry, biology and other related disciplines has promoted the development of the theory, technology and method of pharmaceutical analysis. The development of pharmaceutical science has put forward higher demand for pharmaceutical analysis. Pharmaceutical analysis is not only the analysis of static chemical drugs, traditional Chinese medicines and biotechnological drugs, but also extends to the analysis of static chemical drugs, traditional Chinese medicines and biotechnological drugs. The dynamic analysis, detection and comprehensive quality evaluation of organism, metabolic process, technological process and reaction process were analyzed. Genomics, proteomics and metabolomics have been paid more and more attention in the development of new drugs.

Animal Pharmaceutical Analysis is a major professional course set up in the teaching of Animal Pharmacy in China. It mainly studies the composition, physical and chemical properties, authenticity identification, purity inspection, validity and safety of natural drugs and their preparations whose chemical structures have been clearly defined, and the determination of the content of effective ingredients. It is a "methodological discipline" and also involves the quality

control of biochemical drugs and traditional Chinese medicine preparations. It involves a variety of drug structures, different physical and chemical properties, complex content, students generally reflect that knowledge points are difficult to remember and learn. The experimental course of animal drug analysis is one of the effective means to review and master the theoretical knowledge of animal drug analysis, stimulate interest in learning, cultivate student's ability in practice, train innovative talents and realize students' quality education. It has the same important position as the theoretical course of animal drug analysis. Therefore, the quality of animal drug analysis experiments and the effects of experimental teaching are not only related to improving students' practical ability, research and innovation ability. Qualities such as practical ability, scientific research innovation ability, ability to solve practical problems by using the knowledge they have learned, but also to the tapping of students' potential and the improvement of students' adaptability after entering society. Traditional drug analysis is mostly confined to the control of drug quality by analyzing drug ingredients. However, pharmacy has shifted from substance-centered to life science-based, which has profoundly affected drug research and development, manufacturing, clinical trials and drug use. With the rapid development of Pharmaceutical Science in the 21st century, the trend of integration of life science and pharmacy is deepening. The scientific problems of pharmacology, medicine and other biology-related disciplines have created new challenges and opportunities for pharmaceutical analysis. The application of modern analytical techniques and methods to study the effects and mechanisms of drugs acting on the body is another expanding field of pharmaceutical analysis. The further development of pharmaceutical analysis also needs the technical support of biology, medicine, science and engineering, showing obvious interdisciplinary characteristics. The development of information technology promotes the combination of computer and analytical instrument. Large quantities of chemical measurement data of traditional Chinese medicine can be obtained by computer data acquisition system. However, at the same time, it also brings a serious problem to researchers: the huge analytical data set is too abstract, lacking intuitive and visual overall characterization, such as the original infrared spectrum obtained from the quality control of traditional Chinese medicine, which contains not only the characteristic information of fingerprint area, but also a large number of redundant information of non-fingerprint area, so it is difficult to be directly used in the view of samples. In recent years, with the development of computer science, a large number of information processing technologies have been applied to the research of traditional Chinese medicine and natural medicine, which has brought people a new understanding of the measurement of active ingredients in complex systems, such as the step-by-step extraction of complex chemical pattern characteristics of natural plants.

## 2.2. Teaching Form

Teaching mode is a kind of plan or paradigm that constitutes curriculum, chooses teaching materials and guides teaching activities in classroom and other environments. In the follow-up study, it is pointed out that teaching mode is learning mode. The core of teaching process is to create an environment in which students can interact with each other and learn how to learn. Teaching mode is a learning environment, which has many uses, from how to arrange subjects, courses, units, topics to the design of teaching materials, such as textbooks, workbooks, multimedia programs, computer-aided learning procedures. These models can provide students with learning tools. The definition of teaching mode in China is mainly embodied in three aspects: the first is to classify teaching mode into method category, also known as "methodology"; the second is to think that mode and method are related and different, and will show different structures in specific time, place and conditions, which we call "structure theory". The third definition of teaching mode is: teaching mode is the

subjective choice of objective structure of teaching under the guidance of certain teaching ideas, which can be summed up as "procedural theory". The above definition of teaching mode is only from a specific point of view, which lacks integrity and does not fully touch the essence of teaching mode. In this paper, the author defines it as: under the guidance of certain teaching ideas and theories, in order to achieve specific teaching objectives, design and organize teaching, and in a simplified form, steadily show the basic structure of various teaching activities established in practical teaching. Thus, the teaching mode is not only the concretization of teaching theory, but also the systematic summary of educational experience. It builds a bridge between educational theory and practice.

From the perspective of the development of science education, there have been many educational models, such as Inquiry Training Model, Scientific Inquiry Model, Concepts Attainment Model, Group Inquiry Model and so on. From the point of view of the objectives and contents of the development of science education, we can also classify many models of science education from different perspectives, such as promoting concept acquisition, emphasizing scientific inquiry ability and promoting scientific value judgment. From the perspective of the development and evolution of inquiry teaching mode in science education, it has roughly gone through the following stages and development process. The initial inquiry teaching model is the "Guided Discovery" model, which mainly uses an interesting question or specific material to trigger children's inquiry, and then enables children to explore specific materials and reflect on the findings. In the process, teachers guide children to discuss, listen and establish and test their own understanding. In this mode, children can fully experience the joy of inquiry, and teachers, as facilitators and guides of children's inquiry process, can guide children to explore and explain the results. Since the "directed discovery" model does not pay special attention to scientific knowledge, it ignores children's "false concepts" and "simple theories". On the basis of the "Guided Discovery" model, the "Learning Circle" model has been further developed, and the obvious "Teachers Develop Scientific Knowledge" has been added to guide children's scientific inquiry process. This model is mainly developed by three steps of "learning circle" - exploration, concept introduction and concept application. On the basis of the "learning ring" model, the following five-E model, the predictive mechanism learning ring model, the four-stage learning ring model, the metacognitive learning ring (MLC) model and the early scientific education learning ring model have emerged, which are the further revision and development of the learning ring model.

Any teaching mode has certain elements. Analyzing its teaching mode will help us to understand the essence of teaching mode more deeply. The teaching mode generally includes the following factors: theoretical basis, each teaching mode always has a certain educational theory to support, and the ideas it contains will permeate into every factor and every step of the teaching mode. For example, the non-directed teaching mode is guided by humanistic educational thought. Educational goal, each teaching mode is created for a certain educational purpose, and it is the core of teaching mode. Certain goals lead the direction of teaching mode, all of which are oriented by educational objectives. For example, the goal of non-directive teaching mode is to help students find themselves, realize themselves, and enable students to have autonomous awareness in learning. Implementation conditions, teaching mode to achieve a certain goal must be related to the conditions to achieve the goal. For example, the necessary conditions for the realization of teaching objectives include teachers, students, means, teaching content, teaching methods, teaching tools, etc. The implementation procedure is that the teaching mode has its own operation steps and the tasks to be accomplished in each corresponding step. It specifies the tasks that teachers should accomplish in each activity. Evaluation refers to the method and standard of evaluation. Because each teaching mode has different goals, specific implementation procedures and conditions, each teaching mode

has its own specific evaluation methods and evaluation criteria.

### 2.3. MOOC Mode

MOOC is an online course that is significantly different from traditional online classes. First, the MOOC has a clear curriculum plan and teaching objectives. At the beginning of the online class, the teacher will do a simple course overview, such as the course requirements and progress, the difficulty of the course, the degree of completion of the course, etc.; students register an account with the mailbox and carefully before the course begins. Read the relevant terms and schedule of the course so that you can better plan your progress and understand the job requirements. Second, the instructional video is not a recorded version of the classroom teaching or conference, but a teaching video specially prepared for the MOOC. Third, the entire instructional video is divided into small videos with a length of about 10 minutes. This can not only ensure the level of refinement of the video, the prominence of the teaching content, but also ensure the concentration of students' attention. According to the relevant theory of psychology, the learning activities of students are the most efficient in the first 10 minutes of the course, and then the learning efficiency decreases with time. Fourth, the teaching video is inlaid with a retrospective test (retrieval practice). Only the correct answer can continue to watch the video. If the answer is wrong, you should revisit the video content of the error point. The goal is to keep the attention of the students focused on the instructional video, not on the gap. The development of the MOOC in recent years is shown in Figure 1.

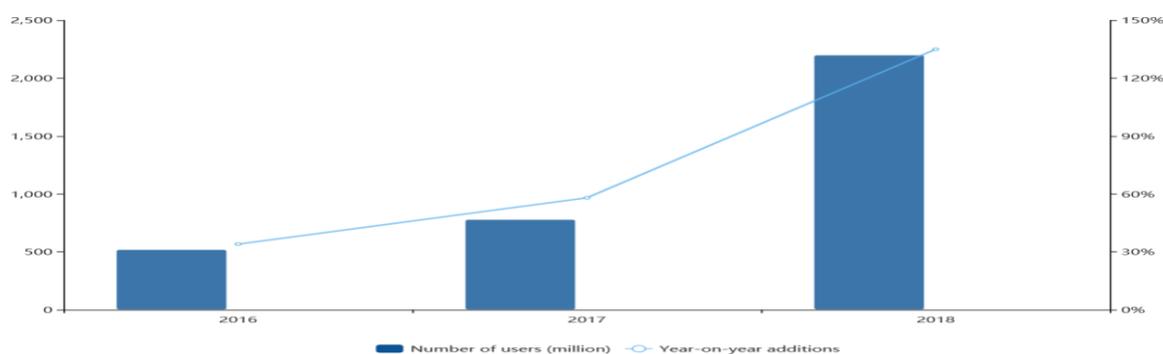


Figure 1. Domestic MOOC users

Fifthly, MOOC provides students with homework submission area and learning exchange area. In the teaching process, students should not only watch all the teaching videos, but also complete a variety of homework, and submit homework through the homework submission area before the deadline. At the same time, we should browse the contents of the discussion area and actively participate in the discussion. If there are any questions, we can also communicate with the teachers and assistants in the discussion area. What is more encouraging is that Mu also organized an offline meeting. Students taking the same course can engage in offline discussions on common topics. There are many small learning groups like this in the United States. They come from different regions, but they have only one purpose: to share their learning experience or experience. If you're lucky, this offline meeting will also involve teachers. Sixth, the evaluation method of Muchu consists of three parts: whether to watch all the teaching videos, whether to complete all the homework and whether to participate in the discussion. One thing worth noting is the problem of homework correction. For example, Coursera uses peer ratings. According to the requirements of homework, such as whether the facts are sufficient, whether the students have the desire to continue

to study in depth and so on, the teachers put forward the rules of grading. The students who evaluate each other can grade the homework of other students according to the rules of grading. Each learner corrects at least five students' homework so that he or she can see others grading him or herself. At the same time, Coursera encourages learners to revise others' homework as much as possible. They believe that peer review is also an effective means of learning. But the final adjustment of homework performance is in the hands of teachers. Studies have shown that peer review assignments are a very effective strategy for providing reproducible grades. Under appropriate incentives, the scores of students' corrections even match those given by teachers. Daphne Kohler, one of Coursera's founders, also believes that large-scale homework revision is an effective learning strategy for students because they can learn a lot from this experience.

## 2.4. Traditional Teaching Mode

The traditional teaching mode of our country was designed and proposed by Comenius. After the conclusion and improvement of Herbart, it was developed by the former Soviet educator Kylov and then transmitted to China. Therefore, the theoretical basis of the traditional teaching model is Herbart's four-segment teaching method, namely, Ming, Lenovo, system and method, and Kailov's teaching theory. There are many traditional teaching modes, such as teaching-based teaching mode, discovery-based teaching mode, and master-based teaching mode. However, the author defines the traditional teaching mode as the explanation-receiving teaching that is widely used in schools of all levels in China mode the founder of this teaching model was Herbart in Germany. After the development and enrichment of his disciples and others, the famous five-segment teaching method was finally formed. This model is characterized by the ability to enable learners to learn knowledge efficiently under the leadership of a teacher in a unit of time. It satisfies the needs of a large number of talents to be trained after the industrial revolution, but the drawbacks of this model are also very obvious. Teachers over-regulate classroom teaching and learners' learning pace, so that learners' autonomy cannot be played well. Some learners are easy to form learning inertia.

The characteristics of the traditional teaching mode: (1) Emphasis on the transfer of knowledge, ignoring the ability to cultivate more than 80% of the students' knowledge acceptance and skill training is completed in the classroom teaching, so classroom teaching is the main position and main channel of biological teaching. The knowledge point guides the progress of the whole teaching process. The traditional teaching mode of the classroom is aimed at knowledge transfer, and ignores the active initiative of students. Teachers regard students as the recipients of knowledge acceptance. Whether it is from the three tasks proposed by Comenius for teaching, or the discovery method of independent exploration advocated by Spencer, or the five-stage teaching method proposed by Herbart is the acceptance of knowledge. Put it in the first place of learning. Emphasizing the task of the students is to digest and understand the content taught by the teacher, to regard the students as the object of infusion, the receiver of external stimuli, the memory of the predecessors' knowledge and experience, and forget that the students are subjective and creative. (2) Emphasis on teachers' explanations, ignoring students' understanding of "preaching, teaching, and confusing" in the traditional teaching mode, emphasizing the dignity of teachers, paying attention to the authority of teachers, and highlighting the central position of teachers in teaching. In such long-term teaching activities, the central position of teachers has been consolidated. This teaching process is a process in which the teacher is completely dominated, and in the teaching method is a complete infusion process. Herbart thinks. Teachers can manipulate students as they please, and students must be absolutely obedient to teachers. In the classroom, there is communication between teachers and students, but such communication is limited to a single "teacher-study answer", that is,

the teacher asks each student once, and each student can only answer once. What is even more unfavorable is that students can't actively ask questions and express their thoughts and actively participate. In the classroom, unless the teacher asks questions, the students are not allowed to interrupt the teacher's established teaching plan. The students will never dare to do so. This kind of thought has been passed down from generation to generation and has been strengthened. This has made students' divergent thinking and reverse thinking constrained and imprisoned. They dared to break through traditional new ideas and new ideas and were slain. The wings of bold fantasy were broken as cognitive subjects. The students are unable to play their initiative. (3) Emphasis on the level of achievement and neglect the comprehensive development of students Under the current college entrance examination system, the mastery of knowledge of students has been changed to be measured by the level of test scores, resulting in students only paying attention to the mechanical mastery of existing knowledge. Lack of creativity and innovation, so there will be many students with low scores and low abilities. Many students limit their reading to a large number of teachings and counseling books, trying to find a way to go to college from the sea of questions, they do not know that their overall development is incomplete. From the fiery registration scenes of various tutoring classes in the winter and summer vacations, it is not difficult to see that students, parents and even some teachers believe that the scores determine everything. China is in the international Olympic competitions in mathematics, physics and biology. Great achievements have been made, but why does China only come out with a winner of the Nobel Prize for Literature? In ancient China, the "one thousand people and one volume" examination method was difficult to test the true level of students, and it was not conducive to students' active participation in learning, which was not conducive to the overall development of students' quality.

### 3. Experiments

In order to explore the influence of the MOOC mode on the course of animal drug analysis, this paper designs experiments to demonstrate the results. The experiment was divided into two groups at the same time, which were experimental group and control group, with 50 students in each group. The experimental group and the control group take the course of animal drug analysis as an example. The experimental group adopts the MOOC mode to teach, and the control group adopts the traditional teaching mode to teach. The experiment time is one month, and finally the influence of the MOOC mode is judged by various aspects such as performance evaluation.

### 4. Discussion

The experiment was divided into two groups. Through this experiment, two different teaching methods have produced certain differences in teaching results. This difference can be seen through the comparison of experimental results. The first part of the experiment is the study of the basics of drug analysis. The ten-day systematic teaching does not fully transfer all the knowledge, but also through the extracurricular learning and expansion of students. After this part is over, compare it by testing. The following are the experimental results as shown in Table 1.

*Table 1. Test results after the end of the first phase*

	Number of people	Average number	Highest number	Lowest number
Control group	50	73.34	91	46
Test group	50	80.53	95	51

According to the data in the table, after the basic knowledge learning stage, the scores of the students in the experimental group and the control group produced a certain gap, and the average score of the students in the experimental group was higher than that in the control group. Figure 2 shows the detailed data:

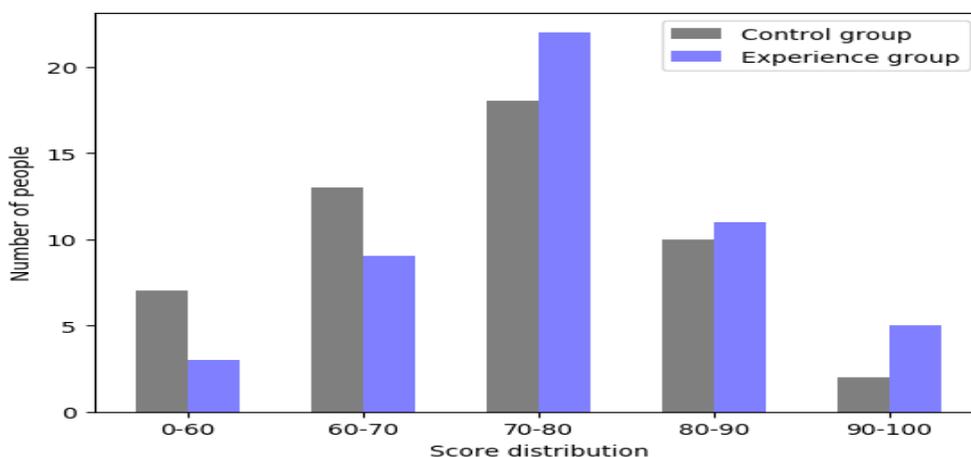


Figure 2. The first part of the teaching test results

It can be seen from Fig. 2 that the number of students with scores of 70-80 is the highest in both the experimental group and the control group. The scores of the experimental group 0-60 are less than those of the control group, and between the high partitions. There are more students. It shows that the teaching mode of MOOC has certain advantages in the teaching of basic knowledge than the traditional teaching mode. In the second part of the experiment, an innovative design practice part is added. The teacher designs the experimental plan and guides the students to complete the experiment, so that the students can cultivate their innovative consciousness based on the skillful use of basic experimental skills. The experimental period is ten days. Also, at the end of the experimental section, a student test is conducted. The experimental results are shown in Figure 3:

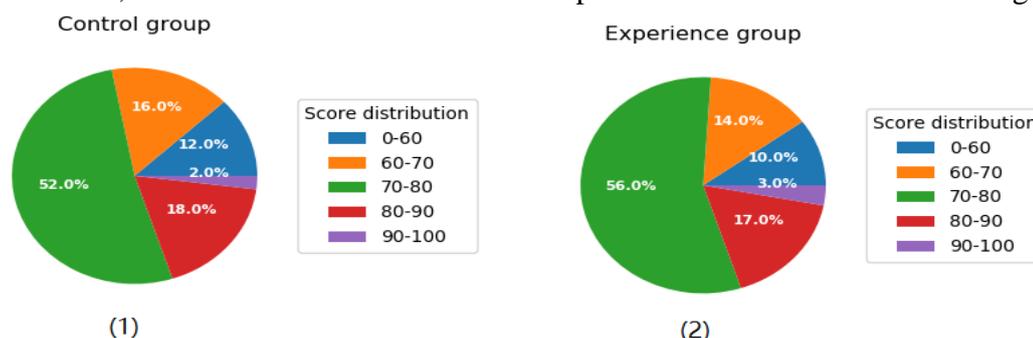


Figure 3. The second part of the teaching test results

As can be seen from the figure 3, for the innovative experimental part, the gap between the two teaching methods is not particularly large, but overall, the teaching method of the MOOC may be more intuitive, the experimental steps are more clear, and the students have more Easy to understand, so the effect is slightly better than the traditional teaching method. In the last ten days, the order of chapters of the textbooks was broken by means of crosstalk, and the classification was explained. Finally, the comprehensive evaluation was carried out. The experimental results are as follows:

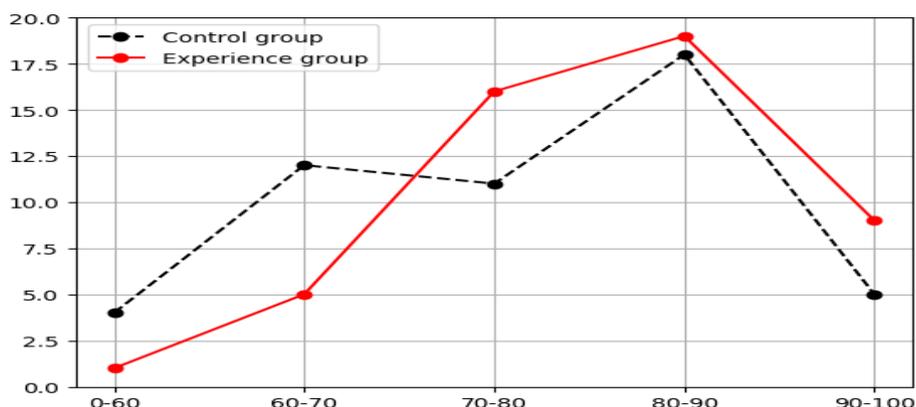


Figure 4. Comprehensive evaluation results

As can be seen from Figure 4, in general, under the MOOC teaching method, the overall performance of the students has improved a lot, and the number of students in the low-level partition has been greatly reduced. Relatively speaking, the number of people in the high-altitude zone has increased, and the number of people in the 90-100 points has increased a lot. This shows that the teaching method of the MOOC has achieved good results in the course of animal pharmacy analysis.

## 5. Conclusions

From the perspective of the traditional teaching model, classroom teaching is carried out according to the plan, and the static teaching plan becomes the plan of many teachers. Each lesson completes the prescribed teaching progress according to the prepared teaching plan. The teacher tells one-on-one, their understanding and understanding of the teaching materials replaces the students' understanding and understanding. The students can only adapt passively, which makes the students lose the thinking process and accept the ready-made knowledge. The teacher "guides" and "trains" the students in the classroom according to the explanations set by the teaching plan. The teaching objectives are achieved, the teaching tasks are completed, and the teacher's purpose is achieved, but whether the students actually get the "guided" "Being cultivated", it is not known. The online course model based on small video and online teaching resources of MOOC like an important catalyst to break the traditional teaching mode and promote the reform of teaching mode. First of all, the class changed the phenomenon of unbalanced quality teaching resources. Through the advantages of network and globalization, every learner on the earth can learn the excellent courses of the world's top universities. Through the use of modern information means, the abstract pharmacy analysis features are intuitive, simple and clear, and the profound theoretical knowledge is constructed into an animation and image mode, providing students with a faster and simpler learning mode. The development of the MOOC is still in its infancy at home, and there are still some shortcomings in teaching level, technology and teaching management. First of all, we must consider how we can establish a good incentive system, so that teachers can actively and actively complete and improve their teaching tasks under the teaching mode of MOOC.

## Funding

This article is not supported by any foundation.

## 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.

## References

- [1] Dejaegher, B., & Heyden, Y. V. (2015) "Hilic Methods in Pharmaceutical Analysis". *Journal of Separation Science*, 33(6-7), pp. 698-715. <https://doi.org/10.1002/jssc.200900742>
- [2] Saxena, S. J., Honigberg, I. L., Stewart, J. T., Keene, G. R., & Vallner, J. J. (2010) "Liquid Chromatography in Pharmaceutical Analysis Vi: Determination of Dantrolene Sodium in a Dosage Form". *Journal of Pharmaceutical Sciences*, 66(2), pp.286-288. <https://doi.org/10.1002/jps.2600660243>
- [3] Zhou, H. L., Zhang, Yang, Zhang, Yan, & Liu, Li Ye. (2012) "Study on Pharmaceutical Analysis Course Teaching of Pharmaceutical Preparation in Engineering Colleges". *Advanced Materials Research*, 482-484, pp.444-447.
- [4] Wakeham, & G. (1935) "An experiment in elementary chemistry teaching". *J.chem.educ*, 12(2), pp.68. <https://doi.org/10.1021/ed012p68>
- [5] Huang, J. M., Sang, C. L., & Luo, S. P. (2012) "Study of The Establishment of Recurrence Endometriosis Model with Traditional Chinese Medicine Treatment". *China Journal of Traditional Chinese Medicine & Pharmacy*, 27(4), pp.814-818.
- [6] Gerard, K., & Mackenzie, L. (2015) "Factors Affecting the Establishment of Occupational Therapy Services in Retail Pharmacy: The Pharmacist'S Perspective". *Australian Occupational Therapy Journal*, 46(4), pp.160-174. <https://doi.org/10.1046/j.1440-1630.1999.00196.x>
- [7] Minniti, L.F.S., Melo, J.S.M., Oliveira, R.D., & Salles, J.A.A. (2017) "The Use of Case Studies as a Teaching Method in Brazil". *Procedia - Social and Behavioral Sciences*, 237, pp.373-377. <https://doi.org/10.1016/j.sbspro.2017.02.024>
- [8] Arrue, M., Ruiz de Alegria, Begoa, Zarandona, Jagoba, & Hoyos Cillero, Itziar. (2017) "Effect of A Pbl Teaching Method on Learning About Nursing Care for Patients with Depression". *Nurse Educ Today*, 52, pp.109-115. <https://doi.org/10.1016/j.nedt.2017.02.016>
- [9] Tsvividis, Y., & Mcandrew, C. (2017) "Operation and Modeling of the Mos Transistor: Special Mooc Edition". *Medicine*, 96(49), pp. e9107.
- [10] Pérez-Sanagustín, M., Hilliger, Isabel, Alario-Hoyos, Carlos, Kloos, Carlos Delgado, & Rayyan, Saif. (2017) "H-Mooc Framework: Reusing Moocs for Hybrid Education". *Journal of Computing in Higher Education*, 29(1), pp.47-64. <https://doi.org/10.1007/s12528-017-9133-5>