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Construction of online and offline blended course of pharmaceutical botany

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Abstract: *In order to avoid the disadvantages of traditional teaching, the course of Pharmaceutical Botany has constructed an online and offline blended course. In this paper, the process of constructing online and offline blended course is elaborated in detail. The entire construction process including four aspects, which are the selection of knowledge points and the production of micro-courses, the construction of online resource base, the update of teaching methods, and the change of teaching assessment. The online and offline blended teaching of Pharmaceutical Botany is carried out, which provides new ideas for the better development of the course.*

Keywords: *Pharmaceutical Botany; Teaching method; Online and offline blended course*

1. Introduction

Pharmaceutical Botany is an important professional basic course of Chinese materia medica and pharmacy, which plays an important role in the professional knowledge system. At the same time, Pharmaceutical Botany is also an important part of medical exchanges among all ethnic groups in the world, especially for the exchange of traditional medicine [1]. At present, in the training curriculum system of pharmaceutical specialty, Pharmaceutical Botany plays a link and bridge between traditional medicine and modern science [2]. However, Pharmaceutical Botany is a professional course that closely combines theory and practice. Because there are many knowledge points in the theoretical course, and the internal logic between the knowledge points is not strong, students generally reflect that there are many scattered knowledge points that need to memorize, especially the content of medicinal plant taxonomy, which is difficult to memorize the morphological characteristics of each family and specie. As a result, students' learning is very boring, and is easy to lose interest. Students are reluctant to learn and are not good at learning [3-4]. There is an urgent need for the reform of teaching methods to mobilize students' enthusiasm for learning and improve students' interest in learning.

Traditional teaching is the main teaching method of current higher education. Teachers play the role of knowledge transfer and porter in traditional teaching, while students accept passively. It is difficult to improve students' ability of autonomous learning and problem solving. In fact, the thinking and ideas of today's students are obviously different from the past. The space, opportunities and ways of students' self-study are various. The channels for students to acquire knowledge have changed, and the classroom is no longer the only place to acquire knowledge. With the development of information technology, the application of teaching methods such as MOOC and SPOC have an impact on traditional education. MOOC-based online and offline blended teaching has become a catalyst for promoting reform. Hebei Agricultural University has successfully applied for the addition of undergraduate specialty of Chinese materia medica since 2004. Pharmaceutical Botany is a professional basic course, which has been offered in the first grade of university. For a long time, Pharmaceutical Botany has been dominated by traditional teaching. In order to solve the problems in traditional teaching, a project of online and offline mixed first-class undergraduate course was constructed in Hebei Agricultural University in 2021. Next, the construction of online and offline blended course of Pharmaceutical Botany is carried out in some aspects.

2. Screening and grading of knowledge points of Pharmaceutical Botany

This course is divided into three parts, introduction, morphology and structure of medicinal plants, and classification of medicinal plants. The teaching content is screened and graded based on the order of cell-tissue-organ-lower plant classification-higher plant classification according to the difficulty of students' acceptance. The first-level knowledge points are the contents that have been covered in high

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school biology class. For example, the contents of the basic structure of plant cells and the proliferation of plant cells, students can self-study through online videos. The second-level knowledge points are the contents that the curriculum syllabus requires to master skillfully. These contents can be carried out by making micro-courses or quoting relevant micro-courses, urging students to learn in the form of self-study +online homework. The difficulties encountered in students' homework can be explained by teachers in a selective and targeted way. The three-level knowledge points are the difficult contents of the course. The teacher needs to combine the methods of intensive teaching + discussion. It should be noted that in the discussion part, it is necessary to actively guide the student' subjective initiative in learning. The four-level knowledge points are mainly based on the knowledge broadening of the teaching content of Pharmaceutical Botany, and guide students to understand the development prospects of medicinal plants through literature retrieval. Through above processes, the course contents of Pharmaceutical Botany are carefully combed and integrated, and the difficulty of knowledge points are distinguished. Students can reasonably allocate their learning time to achieve good learning results through the combination of online and offline.

3. Construction of online teaching resources of Pharmaceutical Botany

Learning APP is a network education platform based on smart phones in China. It has a large number of educational resources and perfect teaching modules, which can make statistical analysis of students' learning situation in real time. Based on the learning APP platform, the learning resources of Pharmaceutical Botany are established, which providing the materials for the online and offline mixed teaching mode.

3.1 Construction of Pharmaceutical Botany Course Resources in learning APP platform

At present, the course of Pharmaceutical Botany has been running for two semesters in learning APP platform. During the course construction, some videos and materials of the course of Guizhou University of Traditional Chinese Medicine were introduced, course PPT and other materials were uploaded. The test database containing 1429 questions were constructed, 30 online assignments have been arranged and completed. 60 tasks were published, through the completion of each task to understand the students' learning dynamics. The number of chapter learning reached 8000 times. The assessment of Pharmaceutical Botany was carried out by using learning APP platform, and online statistical data were introduced in the final assessment of this course.

At the same time, we also continue to build and improve the curriculum resources of Pharmaceutical Botany in the learning APP platform, including course introduction, teaching staff, syllabus, teaching plan, electronic teaching plans of each chapter, teaching courseware, exercise library, test paper library, teaching micro-course, reference materials, knowledge expansion and other columns. It provides students with a variety of channel learning materials such as textbook channel learning, courseware channel learning, video channel learning, exercise channel learning, etc., to meet the learning requirements of students at different levels.

3.2 Construction of medicinal plant image library and micro-course production

The teacher of the course presided over the fourth general survey of traditional Chinese medicine resources in China, and accumulated the teaching practice data of the course over the years. Therefore, the pictures of different types, habitats and organs of the accumulated medicinal plants were sorted out and uploaded on the learning APP platform to construct the picture library of medicinal plants. Flipped classroom can also be used to stimulate students making micro-videos of medicinal plant accumulated in practice or life, adjusting the learning atmosphere, stimulating learning interest, and mobilizing students ' enthusiasm for active learning.

The course contents are classified according to chapters, and 5-10 second-level and third-level knowledge points are selected in each chapter. Micro-course recording is performed for each knowledge point according to the process of topic selection-teaching plan writing-making courseware-teaching implementation and shooting-post-production-teaching evaluation and reflection. Because of the wide variety of medicinal plants, the classification of Pharmaceutical Botany can be made according to the situation of a certain family of medicinal plants or a certain kind of medicinal plants. Micro-course can solve the problem of a certain knowledge point, effectively solve the practical teaching problems, and mobilize the initiative of students ' learning. It can also choose some knowledge points for students to

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make micro-courses and use flipping classrooms to make micro-courses.

3.3 The application of teaching resources of Pharmaceutical Botany

The first round of exploration of online and offline mixed teaching methods has been carried out from March 2021 to July 2021. The second round of trial operation of online and offline mixed teaching was carried out from March 2022 to July 2022. We reflectd on the teaching effect of the second round of trial operation, further adjusted the teaching design, and supplement and improve the curriculum resources such as micro-courses from August 2022 to December 2022. The third round of trial operation of online and offline mixed teaching was carried out from March 2023 to July 2023. Now, the teaching effect of two rounds of trial operation was analyzed and evaluated, which provided practical experience for further development of online and offline mixed teaching of Pharmaceutical Botany.

3.4 Teaching methods in online and offline mixed teaching of Pharmaceutical Botany

3.4.1 Heuristic teaching method

Heuristic teaching runs through the whole teaching process of Pharmaceutical Botany course. Heuristic teaching is not only a teaching method, but also a teaching idea. Through heuristic teaching, we strive to protect and cultivate students enthusiasm for thinking and improve students ability to think actively. For example, when talking about *Salvia miltiorrhiza,*a medicinal plant of Labiatae, its Chinese name is "丹参". It inspires students to understand the meaning of the word "丹", and then shows the root of *S. miltiorrhiza* with brick-red root bark, and enhances students ' memory of the content that the root bark of *S. miltiorrhiza* is brick-red. For another example, when talking about the abnormal structure of the section of *Polygonum multiflorum*, the medicinal material section of *P. multiflorum* is first displayed, which inspires students to think about why the medicinal material section of *P. multiflorum* is different from the section of other plant roots, and then inspires students to associate with the activities of the cambium. Finally, it tells students that this is an abnormal structure, so that students have a deeper understanding of the activities of the cambium.

3.4.2 Teaching method of flipped classroom based on OBE concept.

Outcomes-Based Education (OBE) is an educational concept centered on learning outcomes. It emphasizes that students ' learning outcomes must be consistent with teaching objectives, which can be achieved through clear curriculum objectives and evaluation criteria. In the process of learning, students need to master specific knowledge and skills to achieve the curriculum objectives and expected results. The advantage of OBE is that the teaching objectives are clearer and more specific, which helps students better understand and master knowledge and skills, promote the change of students ' learning attitude and behavior to achieve the expected learning results. While, the biggest feature of the flipped classroom is the process of imparting knowledge. Teachers urge students to use online resources, putting the learning process before class, putting the process of knowledge internalization into the classroom, and solving the difficult problems in a targeted manner. Through this way of learning, Students ' ability to learn problems independently is improved, and students ' classroom participation is improved.

3.4.3 Practical teaching method

Pharmaceutical Botany is a subject with strong application and practicality. Experimental and field practice are important links and practical ways in the teaching of Pharmaceutical Botany [5]. Although the online medicinal plant resource library of Pharmaceutical Botany has been constructed, practice is still essential. Practical teaching is an effective way to consolidate theoretical knowledge and deepen the understanding of theory. It is an important link to cultivate high-quality talents with innovative consciousness. It is an important platform for linking theory with practice, cultivating students to master scientific methods and improving their practical ability. The experimental content and theoretical content of Pharmaceutical Botany course are designed according to 3:2, and there is also a week of teaching practice task. For example, in the classification of medicinal botany, if there is no practical teaching, it is equivalent to talking on paper. Only in the field environment, can we have a more intuitive understanding and strengthen the memory of the taxonomic content learned in the textbook. Before the practice, the teachers ask students to learn online resource library, and then take the problems to participate in practical activities, which will play a multiplier effect. In the practical course, we change the original teacher-centered teaching into student-centered sharing, so as to enhance students ' enthusiasm for learning. This can realize the significance of online and offline mixed teaching. In teaching, students are also encouraged to design experimental plans according to the content of textbooks, participate in ' college

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students ' innovation and entrepreneurship projects ', enlighten students to experience the charm of scientific research, actively participate in practical activities, and build a platform for the cultivation of students ' innovative thinking.

3.4.4 The change of course assessment of online and offline blended teaching

In terms of curriculum assessment, we should change the past way of only paying attention to the final examination results and ignoring the assessment of the learning process, and construct the assessment method of the whole process of curriculum learning (Table 1). The usual score of the course is composed of four parts: online score, usual score (offline), experimental score (offline) and final exam score (offline). The specific proportion and score are based on the following table.

Table 1: Constructing the assessment method of the whole process of curriculum learning

assessment composition	proportion	Scoring basis
Online performance	40%	Check-in(2%) Online learning duration(15%) Online test scores(20%) Online activity participation(3%)
Usual performance	15%	Offline homework(10%) Offline activity participation(5%)
Experimental performance	15%	Experimental classroom performance
Final exam performance	40%	Offline examination results

Through the adjustment of online and offline blended teaching assessment, online assessment has been increased, accounting for 40 %. Through this measure, students are encouraged to make full use of online resources. In this way, the initiative of learning is given to students. The responsibility of teachers in classroom teaching is to remind and inspire, guide students to think, find questions, explore problems, and then solve problems [6].

4. Teaching effects

Blended teaching mode combines the advantages of traditional teaching methods and network. Combined with the teaching advantages, give full play to the role of teachers ' guidance, inspiration and supervision. It controls the leading role of the teaching process and fully reflects the initiative, enthusiasm and creativity of the students as the main body of the learning process. Blended teaching makes learning time and space more free. Therefore, between students and content, between teachers and students, between students and students. The interaction is more timely and deeper. Blended teaching greatly improves students ' enthusiasm for learning, and students ' participation in the course has also been improved. At the same time, the application of information technology in blended teaching has greatly improved students ' interest in learning and made the whole teaching activities lively and interesting. Figure 1 shows Part of the teaching content and the distribution of students' comprehensive scores in Learning APP. It reflects the full application of information technology in blended teaching, and also shows that students ' enthusiasm for online learning has been greatly improved.

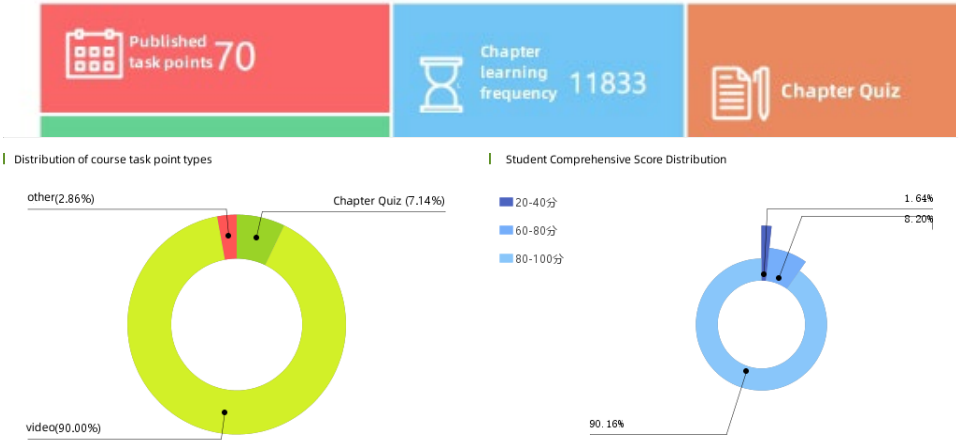

Figure 1: Part of the teaching content and the distribution of students' comprehensive scores in Learning APP

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5. Conclusion

Information technology has been integrated into all aspects of higher education. Under the new situation, the shortcomings of traditional classroom teaching are gradually exposed, which cannot meet the needs of modern higher education. In order to improve students ' learning effect and teachers ' teaching level, blended teaching mode has become the main way of teaching in universities.

Pharmaceutical botany is a subject which mainly studies the species, resources, distribution and utilization of medicinal plants. It plays an important role in students' learning of professional knowledge. In order to improve the teaching quality of Pharmaceutical Botany and students' learning efficiency, we make full use of the advantages of the internet, combine online teaching with offline teaching, and promote the reform and development of teaching. Based on the online and offline blended teaching mode, this paper analyzes the current teaching situation of Pharmaceutical Botany, and puts forward the practical strategy of online and offline mixed teaching mode in medicinal botany, so as to provide reference for improving students ' learning efficiency and teachers ' teaching quality.

In summary, the method of online and offline blended teaching is not a substitute for traditional teaching, but a collision, integration, supplement and improvement with traditional teaching, thus forming a new teaching method under the information technology environment. Blended teaching pays more attention to the change of students ' learning style, the cultivation of students ' good learning habits and the improvement of students ' learning ability [7].

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