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Research and Practice of PBL in Pharmacology Course

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***Abstract*—The PBL (problem based learning) teaching method emphasizes problem-solving as the center, induces students to actively learn, and combines multiple learning paths to analyze and solve problems. Traditional learning methods make students passively accepted and inefficient. In order to improve students' interest and ability in learning and enhance their professional competitiveness, this paper has developed a reform method for problem-based learning. Traditional and PBL methods are applied to two groups of undergraduate students in pharmacy. After a year of practice, traditional method and PBL method have produced different teaching effects for the two groups. The results show that the PBL method is better, and students take the class with questions and show higher enthusiasm.**

Keywords—PBL; Problem-solving; Pharmacology; Reformation

I. INTRODUCTION

Pharmacology is a discipline that studies the interaction between drugs and the body and its laws and mechanisms. It mainly refers to the study of the mechanisms that cause changes in the body's functions when using chemicals to treat diseases. The experimental pharmacology pioneered by German Schmidberg became the basis of modern pharmacology. The focus is on cultivating students' dialectical thinking and ability to analyze and solve problems, laying a solid foundation for clinical medicine. Traditional pharmacology teaching pays too much attention to the teaching of knowledge, while ignoring the cultivation of students' abilities. The teacher-centered teaching model ignores the importance of students as the subject of learning, leading to a decline in students' interest in learning, rich in theory but lack of practice.

The problem based learning (PBL) method was pioneered by Barrows, a professor of neurology in the United States. The PBL method refers to the creative teaching method in which the teacher focuses on the problem in the teaching process. The "problem-centered" here refers to bringing problems to and through all aspects of the teaching process, So that the student's learning becomes a process of feeling and understanding the generation and development of knowledge. At the same time, the process of learning knowledge has become a process of spontaneous “rediscovery” and “re-creation” of students, which can cultivate students' problem consciousness and scientific spirit, and establish innovative qualities [1-5].

The PBL method consists of five links: asking questions - establishing hypotheses - collecting data - demonstration hypotheses – summary, which allow students to actively ask questions, think about problems, and form their own problem-solving solutions.

According to the literature reports, the PBL method is used in physics, psychiatry, nursing programme and other courses, which can effectively improve students' analytical and problem-solving ability compared with traditional teaching [6-10]. Students no longer only stay in the concept of learning, but combine more and more practical questions to conduct more specific and detailed discussions and analysis. Students can put forward their own opinions according to the actual situation, master the correct methods of analysis and problem solving, and find out their own thinking mistakes. Therefore,

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this paper applies the PBL teaching method to the pharmacology course, hoping to improve the initiative and innovation which are lacking in traditional teaching, and guide students into a virtuous circle of learning mode.

II. METHODS

The project used a comparative analysis method to set up the experimental group and the control group. The research object is 60 students of Pharmacy in Jiangxi Science and Technology Normal University. All students were divided into control group and experimental group, 30 people in each group. The pharmacology teaching of the control group used the traditional teaching mode, that is, the teacher-centered teaching mode. The pharmacology teaching of the experimental group adopts the PBL method which is a method of problem- centered.

A. Research Methods

In this study, teachers of control group usually explain to students in the form of ppt or blackboard, and then the students concentrate on listening and their concentration is highly concentrated. The specific method is as follows:

(1). According to the syllabus class time and place;

(2). The textbooks are uniformly ordered by the whole school;

(3). Teaching methods use traditional chalk or ppt teaching methods.

Experimental group adopts PBL method, which contains five links: asking questions - establishing hypotheses - collecting data - demonstration hypotheses – summary. The specific method is as follows:

(1). Ask questions or guide students to ask questions and guide the entire team to teamwork and discussion to solve the corresponding problems;

(2). After mastering the basic skills, the students will go to the Jiangxi University of Traditional Chinese Medicine and other medical colleges to conduct a study in the human physiology and pharmacology room, and learn more through practical learning.

(3). PPt combined with video teaching. Through the study of multimedia materials such as video photos, students can visually see the real human physiological structure on the projector and understand the physiological characteristics of the person;

(4). Strengthen the discussion of students through group discussion methods, so that students can participate in the teaching classroom independently;

(5). Questionnaires are used to keep abreast of classroom effects and student feedback.

B. Evaluation Methods

The pre-test students' enrollment pharmacology test scores are taken as pre-tests, and the final exam scores are taken as post-test scores after the practice to understand the changes in the pharmacological scores of the students before and after.

Besides, questionnaires are used for evaluate. The questionnaires mainly include: students' interest in pharmacology, students' problem awareness, inquiry spirit, problem solving ability and innovation. According to the degree of integration, there are five levels. Each question is given 1 point, 2 points, 3 points, 4 points, 5 points. The lower the score, the higher the student's interest in learning and the stronger the problem awareness.

Moreover, in order to obtain more public opinion, this study used feedback to assess the effectiveness of the reform. Let the two groups of students evaluate the PBL teaching method about whether they are willing to accept such teaching mode.

III. RESULTS

A. The Results and Analysis of Pre-test and Post-test

After one year of pharmacological learning, both groups have improved their academic performance. In particular, the improvement in the scores of the experimental group was significantly stronger than that of the control group.

TABLE I. THE SCORE RESULTS

Groups	Score 90-100	Score 80-89	Score 60-79	Score below 60
Control (pre-test)	1	13	9	7
Control (post-test)	5	10	12	3
Experimental (pre-test)	2	12	8	8
Experimental (post-test)	11	13	6	0

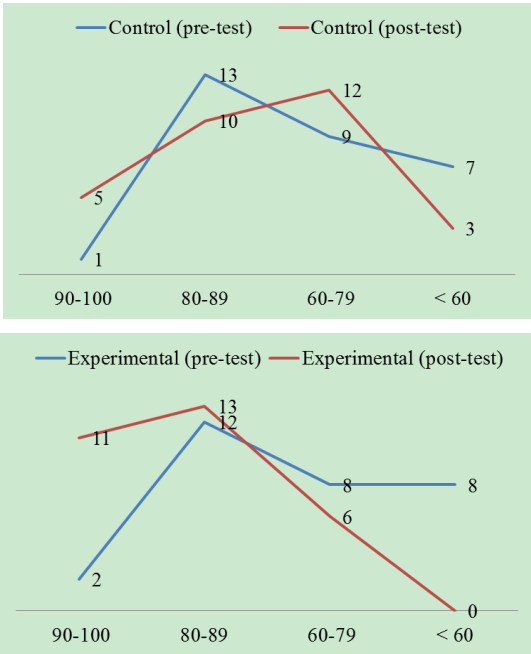

Fig1. The score results

B. The Results and Analysis of Questionnaire

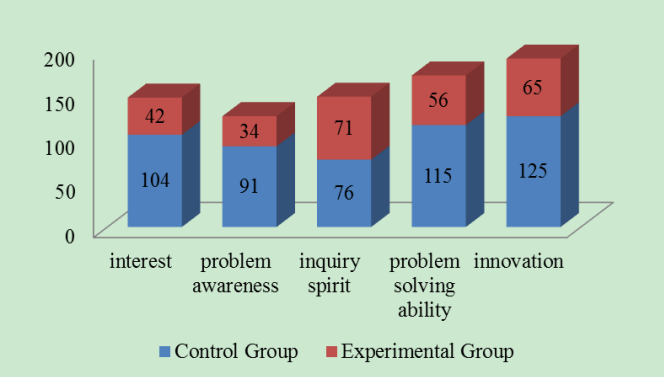

Fig2. The results of qusetionnaire

It is worth noting that in the eight survey contents of the questionnaire, after using the PBL teaching method, 4 of the experimental group were significantly higher than the experimental group, especially the students' interest in pharmacology, students' problem awareness. However, the data of inquiry spirit showed that there was no significant difference between the experimental group and the control group, indicating that more attention should be paid to the cultivation of inquiry spirit in the reform teaching method. All in all, PBLteaching method does have a considerable positive effect on students.

C. Feedback Assessment

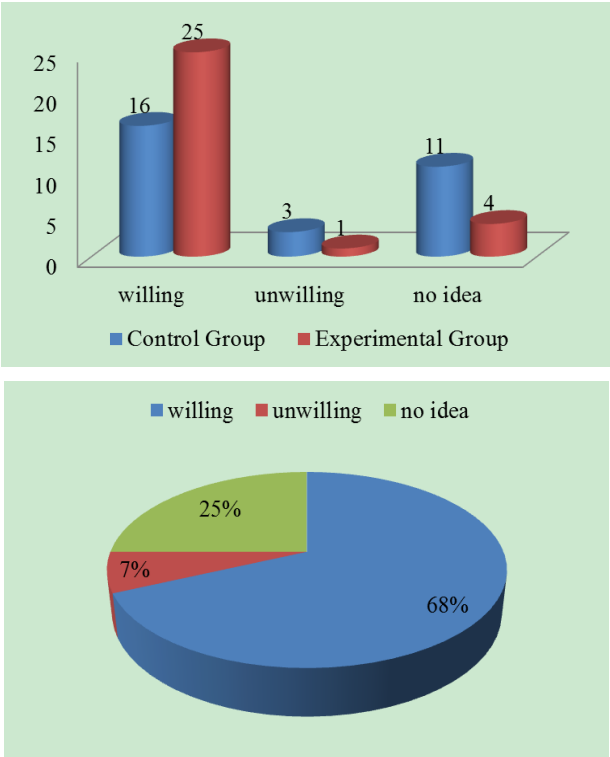

Fig3. Feedback assessment

According to the results of feedback assessment, a total of 68% of students expressed their willingness to accept PBL teaching methods. 83% of the students in the experimental group expressed their willingness to continue to accept such teaching reforms because they have experienced the PBL teaching method. 53% of the students in the control group expressed their desire to experience the PBL teaching method because they saw the excellent results of the experimental group. Only a few people expressed their reluctance to participate in teaching reform. 25% of the students indicated that they have no idea about the teaching reform and traditional method.

IV. CONCLUSION

In this paper, PBL method is used for practice and research in pharmacology courses. All data show that the PBL teaching method provides a platform for students to communicate, collaborate, explore and develop, which enables students to feel the value and charm of pharmacology courses when solving problems. In the teaching activities, students use the "problem" as a clue to discover and explore knowledge according to the problem situation. These activities allow students to better master their skills of thinking and creating, and thus develop creative thinking.

Based on this good result, we speculate that this teaching reform can also be applied to other similar majors, such as medicinal chemistry and pharmacy. With the development and implementation of the new curriculum reform, the advantages of the PBL teaching method have become increasingly prominent. It is one of the means to eliminate the drawbacks of traditional teaching, and it is also the internal source of motivation to stimulate students' learning.

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