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Application of PBL Combined with Multimedia Technology in Standardized Training of Ophthalmic Residents

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Abstract: To study the application of PBL combined with multimedia technology in standardized training of residents. Retrospective analysis was carried out to select 15 general scientists in the rotation of ophthalmology in the standardized training of 2020 residents in the Second Clinical Medical College of Inner Mongolia University for Nationalities from May 2022 to May 2023, and 15 general scientists in the rotation of 2021 residents in the standardization training of ophthalmology. They were divided into the teaching method group of PBL combined with multimedia technology (observation group, n=15). The traditional teaching method group (control group, n=15) was used to statistically analyze the assessment results of residents in the two groups and their satisfaction with teaching methods. The theoretical, clinical skills and comprehensive ability of residents in the observation group were significantly higher than those in the control group (P<0.05).The residents in the observation group were significantly higher than those in the control group (80.0% (12/15), 73.3% (11/15), 73.3% (11/15), 73.3% (14/15), 80.0% (12/15), 80.0% (12/15)86.7% (13/15), the difference was statistically significant (P<0.05).It is concluded that PBL standardized training combined with multimedia technology teaching method is more effective than the traditional single teaching method.

In recent years, with the constant emphasis on standardized training of residents in the field of medical education, ophthalmology is a particularly important field. With the development of modern medical technology, ophthalmic diagnosis and treatment technology has been greatly improved. However, how to transfer these innovative treatment technologies to the new generation of clinicians is one of the important problems that ophthalmology education faces. To solve this problem, PBL teaching method has gradually been applied to medical education, and has become one of the key methods to promote the reform of medical education.

At the same time, multimedia technology, as an important tool in the digital era, is also increasingly used in the field of medical education. Through multimedia technology, pictures, videos and other resources can be integrated into teaching to help students better understand knowledge and improve their learning interest and learning effect. Therefore, the application of

PBL teaching method combined with multimedia technology in the standardized training of ophthalmic residents deserves further discussion and research.

1. Data and methods

1.1 General information

In this paper, 30 patients with standardized training of resident physicians from May 2022 to May 2023 were retrospectively selected and divided into PBL combined with multimedia technology teaching method group (observation group, n=15) and traditional single teaching method group (control group, n=15).Among the residents in the observation group, there were 6 males (40.0%) and 9 females (60.0%), aged 22-28 years, with an average of (24.2 ± 2.2) years; In terms of educational background, there were 10 undergraduates (66.7%) and 5 masters (33.3%).In the control group, there were 8 male residents (53.3%) and 7 female residents (46.7%), aged from 21 to 28 years, with an average of (23.2 ± 2.3) years; In terms of educational background, 11 cases (73.3%) were undergraduates and 4 cases (26.7%) were masters. There was no significant difference in the general information of residents between the two groups (P>0.05).

1.2 Inclusion and exclusion criteria

Inclusion criteria: (1) good compliance; (2) admission results.
Exclusion criteria: (1) quitting halfway; (2) poor compliance.

1.3 Methods

1.3.1 Control group

Teachers are student-centered, and strictly follow the relevant clinical information of patients in the teaching process to make problem solving serve the subject knowledge.

1.3.2 Observation group

(1) PBL teaching. Resident doctors ask carefully prepared clinical patients about their medical history and check their physique to promote the formation of preliminary diagnosis and treatment plan. Teachers guide residents to sort out patient information and finally answer and summarize relevant questions.

(2) As an important tool in the digital era, multimedia technology is also increasingly used in the field of medical education. Through multimedia technology, pictures, videos and other resources can be integrated into teaching to help students better understand knowledge and improve their learning interest and learning effect

Overview of PBL teaching method: PBL is a teaching mode of learning in solving problems, finding and solving problems in learning, emphasizing that students are the main body of learning, teachers play a guiding role, and cultivate students' comprehensive ability to solve problems[1].The traditional teaching method takes teachers as the main body, and students usually acquire knowledge passively. What they focus on is students' mastery of knowledge. Students' potential in many aspects cannot be fully exerted, which may lead to students' high scores and low abilities[2].

1.3.3 Characteristics of PBL teaching method

The PBL teaching method has the following characteristics:

(1) Problem oriented. In the process of learning, students are asked to ask practical questions by the teacher, and find answers and solve problems by themselves according to the requirements of the questions.

(2) Students learn independently. In the process of independent thinking and discussion, students will constantly master relevant knowledge and skills to improve the efficiency and quality of their own learning.

(3) Interdisciplinary. In addition to establishing basic concepts and knowledge in the field of ophthalmology, students also need to use relevant knowledge and skills in other disciplines to analyze and solve problems.

(4) Emphasize teamwork. In the PBL teaching method, students need to form groups and cooperate and encourage each other in the process of discussing problems to form an effective learning atmosphere.

Development and Application of Multimedia Technology in Medical Education

Multimedia technology is that teachers use multimedia software for teaching, which is characterized by image, concreteness and vividness. Dermatology and venereology focus on skin lesions, intuitive, multi disease, complex clinical manifestations, and closely related to internal, external, gynecology, children and other disciplines, with strong discussion.

The application of multimedia technology in medical education has the following advantages:

(1) Enriching teaching content: In the traditional teaching process, some knowledge points may be difficult to simplify and present clearly. Multimedia technology can use images, animation, audio and other means to present teaching content, making teaching more intuitive and vivid.

(2) Enhance students' memory: Teachers can integrate multimedia technology into teaching with various forms of resources to improve students' audio-visual experience, so as to improve students' memory effect.

(3) Stimulate students' interest: By using multimedia technology and presenting rich pictures, videos, music and other materials, teachers can broaden students' horizons and greatly improve students' interest in subjects.

(4) Improve the teaching efficiency of teachers: teachers make courseware through multimedia technology, reduce the teaching burden and improve the teaching efficiency.

1.4 Observation indicators

(1) Assessment results. Including theory, clinical skills, and comprehensive ability. 0~100 points for each item, indicating low~high; (2) Satisfaction with teaching methods. It includes enlightenment and interaction of teaching and learning, improvement of learning effect, diagnosis and treatment ability, reduction of learning burden, and overall evaluation.

1.5 Statistical methods

SPSS 21.0 is used, and the measurement data is expressed by ($x \pm s$), and t test is used; The counting data is expressed in (%) $\chi 2$Inspection.$P<0.05$ indicates that the difference is statistically significant.

2. Results

2.1 Comparison of general data of residents in the two groups

There was no statistically significant difference in the comparison of general data of residents in the two groups ($P>0.05$).See Table 1.

2.2 Compared with the examination results of residents in the two groups

The examination results of theory, clinical skills and comprehensive ability of residents in the observation group were significantly higher than those in the control group (P<0.05).See Table 2.

2.3 Comparison of residents' satisfaction with teaching methods between the two groups

Residents in the observation group were significantly more satisfied with 100.0% (15/15), 93.3% (14/15), 93.3% (14/15), 93.3% (14/15), 93.3% (14/15), 86.7% (13/15), 93.3% (14/1573.3% (11/15), 73.3% (11/15), 73.3% (11/15), 80.0% (12/15), 86.7% (13/15), the difference was statistically significant (P<0.05).See Table 1-4.

Table 1: Comparison of General Information

project		**Observation group (n=15)**	**Control group (n=15)**	**X^2value**	***P value***
Gender (%)	Male female sex	6(40.0) 9(60.0)	8(53.3) 7(46.7)	1.130	>0.05
Age (years)		24.2±2.4	23.2±2.3	1.781	>0.05
Education background (%)	undergraduate master	10(66.7) 5(33.3)	11(73.3) 4(26.7)	0.850	>0.05

Table 2: Comparison of resident examination scores between the two groups (score, x±s)

Group / assessment	Theoretical grades	Skills assessment	Comprehensive
Observation group	90.5±11.2	80.5±16.6	88.5±14.3
Control group	80.5±10.6	70.5±12.2	78.4±13.2
T value	4.513	3.462	4.251
P value	<0.05	<0.05	<0.05

Table 3: Comparison of satisfaction with teaching methods between the two groups (students,%)

Group / result	**Inspiring**	**Interactivity**	**Learning**
Observation group	15 (100.0)	14 (93.3)	14 (93.3)
Control group	12 (80.0)	11 (73.3)	11 (73.3)
T value	10.56	8.54	8.54
P value	<0.05	<0.05	<0.05

Table 4: Comparison of satisfaction with teaching methods between the two groups (students,%)

Group	Diagnosis and treatmen	Reduce study load	Overall evaluation
Observation group	14 (93.3)	13 (86.7)	14 (93.3)
Control group	11 (73.3)	12 (80.0)	13 (86.7)
T value	8.54	6.65	5.67
P value	<0.05	<0.05	<0.05

3. Discussion

In recent years, hospitals have paid more attention to the standardized training of residents. The clinical manifestations of ophthalmic diseases are special, and some auxiliary examinations and

treatment methods are highly professional. After entering the clinic, the students were at a loss, and their theoretical knowledge was separated from practice, because they did not have a deep understanding of eye diseases and could not grasp the subject of the ever-changing symptoms. The way to solve this problem is to see more patients, communicate more with patients and read more books. However, at present, patients have strong awareness of rights protection and are unwilling to cooperate with teaching. In addition, the diagnosis and treatment of ophthalmic diseases need strong equipment, resulting in insufficient clinical teaching resources, which affects the teaching of ophthalmology.

PBL teaching method and multimedia technology have been widely used in the field of medical education. Adopting PBL teaching method can effectively improve students' autonomous learning ability and creative thinking ability; At the same time, with the help of multimedia technology, students' understanding of ophthalmic knowledge has also been greatly improved. Traditional PBL teaching is problem-based teaching, which is a problem-based, student-centered, teacher led group discussion and self-learning teaching model[3].This is different from the traditional teaching method of "preview - listen - review - exam", which is mainly taught by teachers. PBL first asks questions, and then puts students in the context of learning medical problems. Through solving practical medical problems, PBL conducts systematic learning of knowledge, and cultivates the ability of medical students to learn independently. However, after years of clinical teaching practice, there are many problems in the practical application of PBL. First of all, PBL teaching method has relatively high requirements for students' ability to learn independently and consult literature independently, which often requires students to have a certain amount of medical knowledge reserves, clinical experience, and a certain ability to respond to emergencies and analyze problems comprehensively. However, because PBL is different from the traditional method of seeing blood, it lacks the integrity of theoretical knowledge, so some students with poor self-learning ability cannot adapt, In particular, they do not have a firm grasp of basic knowledge. Thirdly, the teaching time occupied by PBL is relatively long, coupled with the heavy workload of medical students themselves, if PBL occupies too much spare time, students will have a rebellious mentality, and will not be able to achieve the ultimate goal of PBL. To sum up, the traditional PBL teaching method is difficult to be fully applied to the teaching of Chinese medical professional courses.

With the development of modern science and technology, multimedia technology has been widely used in the field of medical education. Through multimedia technology, various forms of resources can be integrated into teaching to help students better understand knowledge and improve their learning interest and learning effect. Multimedia teaching is to apply the function of multimedia teaching software to teaching, which can make full use of pictures, words, sounds, videos and other materials. For students, the disadvantages and solutions of multimedia teaching are: ① The amount of multimedia materials is large, the number of class hours is small, and students may be difficult to digest a large amount of information in a short time, leading to low learning efficiency[4].This requires teachers to choose typical cases to explain. Some materials can be distributed to students through WeChat, QQ and other ways to use the time flexibility of fragments for learning. Some research shows that the PBL teaching method with WeChat improves students' enthusiasm for learning. Students can ask questions in time, which is also an effective teaching method[5]. ②Multimedia teaching lacks communication between teachers and students, and teachers may return to the traditional teaching method of cramming in multimedia materials explanation, which needs to strengthen interaction with students. For example, you can ask students to describe skin lesions in professional terms, and invite students to do some association and comparison games[6], such as using colored sand, fruits, coarse grains, flowers, etc. to make typical skin lesions of a certain disease. Flashcard exercise: flash a picture quickly, and students answer the name of skin lesions or diseases. Others include flopping, playing hamsters, etc. For teachers: ①

The collection of multimedia materials is cyclical and a long-term process, and the materials may not be comprehensive enough and have sufficient visual impact. This requires teachers to cooperate and share information. ②Teachers' ability to make multimedia courseware is uneven, and teaching quality is affected. This requires teachers to strengthen courseware making ability and learn relevant knowledge of Powerpoint. Teachers should take part in some multimedia teaching competitions to strengthen learning and communication with other teachers.

Some scholars pointed out that the development direction of medical teaching in the future is the comprehensive application of various teaching methods and learning from each other[7].At present, examples of teaching methods available for reference are as follows: team teaching is the simultaneous teaching of more than two teachers, and teaching tasks are completed through the interaction between teachers and teachers, teachers and classmates, and classmates and classmates[8].The sandwich teaching method is based on the premise of small class teaching, with multiple teaching links interspersed, such as student group discussion, cross learning between groups, and student centralized reporting[8].Advanced intelligent simulation system, students practice medical process by simulating realistic medical scene[9].Case teaching method: use PBL method to study and discuss typical cases, and connect the learned knowledge[10].Some scholars have applied PBL and multimedia technology to teaching and achieved results[11-14].

The results of this study show that the residents in the PBL combined with multimedia technology teaching method group are significantly higher than those in the traditional teaching method group in terms of inspiration, interaction, improvement of learning effect, diagnosis and treatment ability, reduction of learning burden, and satisfaction with overall evaluation of teaching and learning, and also promote the residents' enthusiasm for learning and work. Residents can rely on their own interests, needs Mastering the knowledge and the questions raised by the teaching teacher will be helpful to retrieve the case data of interest at any time, so as to transform passive learning into active learning, and stimulate the learning interest of residents.

To sum up, the application effect of PBL combined with multimedia technology teaching method is better than that of traditional teaching method. At present, PBL combined with multimedia technology teaching mode is still in the exploratory stage in ophthalmology. Although this research shows that PBL combined with multimedia technology teaching method is beneficial to the cultivation of students' self-learning, cooperation, innovation and other abilities, the traditional teaching method is deeply rooted in the influence and PBL teaching method has high requirements for teachers and students' comprehensive ability, which is not easy to implement, and there are still some problems, This requires further exploration and research, and combined with multimedia teaching and other teaching methods. It is expected to provide a better teaching method and theoretical basis for the teaching of ophthalmology residential training.

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