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Application of problem-oriented learning model in otorhinolaryngology teaching under network environment

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Abstract: *In order to explore the effect of problem-oriented learning mode in otolaryngology teaching in the network environment, 102 otolaryngology students from April 2022 to April 2024 were selected for analysis, and randomly divided into 51 cases in the control group and 51 cases in the experimental group. Through the implementation of the conventional teaching mode and the implementation of the Internet + problem-oriented learning mode, the comparative teaching results, students' self-efficacy, engagement, burnout and other indicators were analyzed. The results showed that the experimental group students' learning behavior, learning ability self-efficacy evaluation index and total score were better than the control group, the basic knowledge and practical operation scores of the control group and the experimental group students were lower than the control group, and the attention, energy, motivation and total score of otolaryngology students were better than the control group. Low sense of achievement, improper behavior and low mood, the total score of the experimental group was better than that of the control group, and the teaching satisfaction was better than that of the control group, with statistical significance between the groups ($P < 0.05$). The conclusion is that the implementation of the problem-oriented learning model in the network environment can improve students' comprehensive level, ensure students' academic performance, reduce students' burnout in the learning process, and improve students' learning enthusiasm and initiative.*

Keywords: *Network environment; Department of Otolaryngology; Problem-oriented learning model; Teaching effect*

1. Introduction

The Department of Otolaryngology is a clinical secondary discipline, involving otologists, nasal and craniofacial diseases, pharyngeal and maxillofacial diseases, laryngology, tracheoesophageal science and cervical science. Otolaryngology is a highly professional and esoteric subject involving a wide range of medicine, deep anatomical structure, and complex spatial structure that is difficult to imagine and understand [1]. In the five-year undergraduate clinical medicine training system, seniors and seniors start to contact this subject, with short teaching time and heavy learning tasks, so how to improve teaching efficiency becomes the top priority. The traditional teaching mode is offline classroom teaching, in which students bring textbooks to class offline, teachers teach relevant theoretical knowledge with the help of slides in class, and students listen to lectures and ask questions [2]. In this traditional mode, students rely on teachers, passively accept knowledge perfusion, lack of active thinking process, and the teaching effect is mediocre. Especially for otolaryngology such a profound and abstract subject, under the traditional teaching mode, the learning effect of students is not satisfactory. In addition, in the long run, students gradually lose pioneering thinking and information processing skills, which is not conducive to the overall development of students. Therefore, 102 cases of otolaryngology students were selected to study the teaching mode and explore the teaching effect under different modes.

2. Data and methods

2.1. Clinical data

A total of 102 otolaryngology students from April 2022 to April 2024 were selected and randomly divided into 51 control groups, including 11 males and 40 females, aged 18-22 years, with an average age of (20.01±1.21) years. The age of the experimental group was 17-23 years old, with an average age

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of (20.13±1.02) years. There were 12 males and 39 females in the 51 experimental group, and there was no statistical significance in age and gender data comparison (P > 0.05), indicating comparability.

2.2. Method

(1) Control group - conventional teaching: Students in this group were given traditional inflowing teaching guidance and instructed to learn according to the content of the textbook.

(2) Experimental group - based on Internet + problem-oriented learning model:①Determination of teaching process: a. Guided learning: Teachers should make clear the teaching time, frequency, PBL learning arrangement, introduction of course cases, group grouping and division of labor of members. b. Guide self-study: teachers should guide students to learn relevant knowledge according to the case before class; After-school learning teacher distributed extension resources. c. Online discussion: Discuss the learning content, pre-class preview, teaching materials, and test questions after class through the Internet platform or mailbox. d. Learning assessment: Students learn the content of the textbook according to the teacher's case questions, and study the research report in a timely manner, and the teacher evaluates the learning.②Independent learning before class: students use rich online resources for independent learning before class. Through various learning materials such as pictures, videos and courseware, students can have a certain understanding of otolaryngology, anatomical structure and physiological functions. They can think about difficult things by themselves first. If they are still difficult to understand, they can communicate with teachers online or ask questions in class. The group leader should conduct group discussion and research on the teaching plans on the Internet platform, understand the existing problems through data reference, and determine the teaching objectives. At the same time, teachers should use network meetings and emails after class to understand the learning progress, give timely and correct guidance, and put forward targeted suggestions; Make a preliminary solution after the group raises questions, and summarize the "PBL Learning and Discussion Record Form". ③ Classroom interaction: teachers no longer teach in full class, but to satisfy students' main class status and guide students to participate in classroom teaching. Before class, we should first pay attention to students' online learning, summarize and summarize related problems according to the doubts students encounter in learning, further optimize the teaching content, focus on explaining difficult points and key problems, and summarize and summarize knowledge points. The teacher should analyze the pre-class problems, ask the team and members to put forward their personal learning results and opinions, and give answers by the teacher, and then guide the new questions, guide the learning to explore new solutions, record the discussion process, make slides, and retain the learning results.④Homework and communication after class: students will post the key points, difficulties and doubts they encounter when learning online on the online platform. Students can discuss the problems in time through the platform. Students who fail to raise questions in class can communicate with team members or teachers in time through the online platform to increase the interaction between teachers and students. Through the online timely assignment of homework to consolidate the knowledge learned, after the completion of the work line, the teacher online correction feedback, improve efficiency. At the same time, teachers should use the Internet platform to summarize the characteristics, key points, difficulties and basic concepts of cases in the course after class, and learn to consolidate knowledge by using the Internet.⑤ Assessment and mutual evaluation: Timely assessment and evaluation of teaching effects and students' learning. The online evaluation system is convenient for statistics, including students' online study frequency and practice, class performance, class grades and participation in discussions. At the same time, students can also put forward their opinions on the teaching of this subject to promote the improvement of the quality and level of teaching.

2.3. Observation index

(1) Teaching results: Each score is worth 100 points, the higher the score, the better the result.

(2) Self-efficacy: assessment of students' learning behavior self-efficacy and learning ability self-efficacy scores.

(3) Learning engagement: Record the assessment scores of students' motivation, energy and concentration, and record the total value. The higher the score, the more ideal the input.

(4) Learning Burnout Scale: To understand the learning burnout of the two groups of students, including low sense of accomplishment, improper behavior and low mood. The lower the score, the lower the degree of burnout.

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(5) Teaching satisfaction: including the number of cases of very satisfaction, relatively satisfaction, general satisfaction and dissatisfaction.

2.4. Statistical significance

The analysis data were analyzed using SPSS 23.0 software, the rate (%) was used to describe the counting data, and the comparison between groups was tested by 2 lines. The measurement data were described by ($\bar{x}$ ±s), and the independent sample t test or paired t test was used for comparison between groups. P<0.05 was considered statistically significant.

3. Results

3.1. Academic performance

Compared with the experimental group, the former group was worse than the latter in basic knowledge and practical operation scores, and the comparison between groups had statistical significance (P < 0.05).(As shown in table 1)

Table 1:Assessment of theoretical knowledge and practical performance of two groups of otolaryngology students (score)

Group	Number of cases	Theoretical knowledge	Skill level
Control group	51	70.56±2.43	72.14±2.62
Experimental group	51	89.77±2.81	86.99±2.93
t		36.9281	26.9809
P		<0.05	<0.05

3.2. Self-efficacy

The indexes of learning behavior, self-efficacy of learning ability and total score of the experimental group were better than those of the control group, and the comparison between the groups had statistical significance (P < 0.05).(As shown in table 2)

Table 2 Self-efficacy assessment scores (scores) of otolaryngology students in two groups

Group	Number of cases	Learning behavior	Learning ability	Total score(score)
Control group	51	39.21±1.33	36.25±1.07	75.44±2.09
Experimental group	51	42.17±1.41	40.18±1.16	82.34±1.71
t		10.9057	17.7842	18.2475
P		<0.05	<0.05	<0.05

3.3. Engaged state

Otolaryngology students in the experimental group were better than the control group in the evaluation indexes of concentration, energy, engagement motivation and total score, and the comparison between groups was statistically significant (P < 0.05).(As shown in table 3)

Table 3 Participation Status assessment scores (scores) of the two groups of otolaryngology students

Group	Number of cases	Motive	Vigor	Concentration	Total score(score)
Control group	51	22.31±1.54	23.29±1.56	26.19±1.44	72.30±2.17
Experimental group	51	27.29±1.43	25.38±1.23	30.22±1.18	82.16±2.53
t		16.9229	7.5132	15.4588	21.1255
P		<0.05	<0.05	<0.05	<0.05

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3.4.Burnout situation

Otolaryngology students in the experimental group were better than the control group in low sense of achievement, improper behavior and low mood, and the total score was statistically significant ($P < 0.05$).(As shown in table 4)

Table 4 Assessment scores of learning burnout of otolaryngology students in two groups

Group	Number of cases	Low sense of achievement	Misconduct	Feeling down	Total score(score)
Control group	51	18.29±1.66	14.19±1.29	15.26±1.24	47.28±2.11
Experimental group	51	15.27±1.23	12.13±1.31	13.22±1.08	40.02±2.15
t		10.4388	8.0016	8.8595	17.2110
P		<0.05	<0.05	<0.05	<0.05

3.5.Teaching satisfaction

After evaluation, the teaching satisfaction of the experimental group was better than that of the control group, $P < 0.05$.

Table 5: Comparative analysis of teaching satisfaction between the two groups of students (%)

Group	Number of cases	Very satisfied	Relatively satisfied	General satisfaction	Dissatisfy	Satisfaction
Control group	51	11	15	15	10	80.4%
Experimental group	51	30	10	10	1	98.0%
X^2		-		-	-	8.2537
P		-		-	-	<0.05

4. Discussion

To become a qualified clinical medical worker, anyone not only needs to have perfect theoretical knowledge, but also needs to continuously improve their personal level in clinical practice, closely combine theory and practice, and make sure that comprehensive operation meets the needs of clinical development. According to the report, most highly effective medical students have completed systematic theoretical knowledge learning in the hospital, but they are unable to complete complex clinical diagnosis and treatment work in a short time. Especially in the otolaryngology department, the department receives more patients every day, the condition is complex, and the comprehensive level of the clinician is required to be higher. Another study [3] proposed that due to the limited teaching hours and practical operation of medical students in school, and the certain limitations of traditional teaching, students' grasp of clinical theory and practical operation knowledge is relatively scarce. When they come into contact with patients, especially complex cases, students often feel helpless and fearful, which severely affects their initiative. Therefore, during the teaching of otolaryngology students, it is necessary to pay attention to the teaching methods, choose new teaching models, make up for the shortcomings of traditional teaching, and actively improve the quality of regular training to ensure the teaching effect. Under the traditional teaching method, teachers did not fully explain the basic medical courses during the course of teaching, but only took practical, sufficient and necessary as the main teaching principles, and paid more attention to the cultivation of students' operational ability and professional skills, resulting in the poor quality of the combined teaching of theoretical knowledge and practical skills. Based on this, this paper proposes to provide Internet-based +PBL teaching model for otolaryngology students.

With the progress of modern science and technology, new teaching methods continue to emerge, and the model represented by "Internet +" has become the mainstream. The "Internet +" model combines online teaching platform, mobile client learning app and offline classroom, which not only breaks the limitation of teaching space, but also enables students to find relevant materials through the Internet according to their own needs, laying a solid foundation for better learning of otolaryngology knowledge [4]. Under the background of "Internet +", blended teaching covers all teaching links before and after class, which can strengthen the interaction between teachers and students. Teachers can control the teaching progress more comprehensively through the network, and help students better complete their

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learning goals by using online resources and tests. Under the background of "Internet +", how to better complete the mixed teaching mode of online and offline is a problem that many college teachers focus on. The teaching mode based on the Internet + is novel. During the teaching period, students are required to prepare for class in advance, including learning processes such as pre-class testing and pre-class discussion, and have clear learning goals for students. After class, we will push and expand teaching resources to students, make after-class learning task lists and test questions, and provide rich teaching resources for students to learn fragmented and independent learning during nursing study. At the same time, the problem-oriented learning model optimizes the conventional teaching model, requires the combination of various learning forms, including online and offline learning, and the use of Internet media to increase the connection between students and students, teachers and students, so as to improve students' autonomous learning ability and solidarity and cooperation ability. The results of this study show that the experimental group is better than the control group in the evaluation indicators of learning behavior, learning ability self-efficacy and total score; the control group and the experimental group are worse than the latter in the basic knowledge and practical operation scores; the otolaryngology students are better than the control group in the evaluation indicators of concentration, energy and engagement motivation and total score. Low sense of achievement, improper behavior and low mood, total score of the experimental group was better than the control group, teaching satisfaction of the experimental group was better than the control group, there was statistical significance between the groups, $P < 0.05$. It can be seen that teaching in the form of Internet + can reduce students' learning burnout, improve students' enthusiasm and initiative in learning, improve students' overall academic performance, require students to invest a lot of energy and focus during learning, and ensure teaching quality and teaching effect. Another study pointed out that the Internet + teaching model is advanced, and "Internet +" is considered to be a new form of Internet development and a new business format under innovation 2.0, and a new form of economic and social development driven by knowledge society innovation 2.0. This study combines and deeply integrates "Internet +" with medical teaching to create a new development ecology. With the help of this cross-border and innovative integration, we can deepen the teaching reform and improve the training system. At the same time, this teaching model integrates otolaryngology, a clinical discipline, with the Internet platform, artificial intelligence and simulation technology, breaking the space and time constraints, so that students can learn more autonomously and efficiently. In addition, the implementation of problem-oriented teaching in the form of Internet + can guide students to actively participate in teaching activities, stimulate students' emotions, require them to explore learning content independently under the encouragement of teachers, transform students' learning cognition from tasks to values, and guide students to obtain higher level of instruction during learning [5]. At the same time, teachers guide students to consult various materials and literature and share and discuss interactive problems, which not only promotes students' mutual help behavior, but also ensures students' exploration spirit and learning interest during teaching [6].

To sum up, the application of problem-oriented learning model in otolaryngology teaching and learning under the network environment can ensure the teaching effect, improve students' academic performance, reduce students' learning burnout, promote students' greater learning enthusiasm, and guide students to actively participate in teaching activities to ensure the smooth development of teaching activities.

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