**The application of joint classroom discussion case-based learning teaching method in the field of urology.**

**Abstract**

In teaching poses significant challenges for clinical doctors and medical students. Students frequently struggle to apply theoretical knowledge in real clinical contexts. We explore the joint discussion of flipped classroom in urological surgery theory teaching case-based learning (CBL) applies effects. This study aims to assess the effectiveness of integrating Case-Based Learning (CBL) with a Flipped Classroom (FC) approach in the context of nephrology bedside teaching.

**Methods:**

Select students from International Education College of Hebei North University and Lahore University from June to September 2021.

Classes 1 to 4 of the 2018 clinical medicine undergraduate students belonging to the hospital were selected as the research subjects. There were 160 students in total, and 80 students were randomly selected as the experimental group. The flipped classroom joint discussion The CBL teaching method is used when teaching lectures. The process prepares teaching cases for teachers, writes courseware, and enables students to study independently before class. practice, classroom discussion-based CBL teaching, and after-class review; 80 students served as the control group, adopting pre-class preview. Teacher’s explanation; after-class review; after-class homework traditional teaching model. Examination and questionnaire will be conducted after the urinary system theory lecture. Survey students' satisfaction with this teaching model.

**Results and test scores of the experimental group**

The score of (91.52±4.78) was higher than that of the control group (83.76±3.52), and the difference was statistically significant. Economic significance (P ＜ 0.05); the score of case analysis questions (25.87±0.54) is higher than the score of the control group (21.46±0.76); the difference was statistically significant (P ＜ 0.05); Moreover, the proportion of people with test scores of 80 and 90 or above in the experimental group was also higher than the control group (P ＜ 0.05). The experimental group is improving its independent learning ability and strengthening clinical practice. Cultivate clinical thinking ability, improve the ability to analyze and solve clinical problems, and strengthen understanding and memory of knowledge points, strengthening teamwork skills, strengthening teacher-student interaction, The satisfaction of these 7 items of this teaching model is higher than that of the control group (P ＜ 0.05); in terms of taking up spare time and increasing their study load, the students in the experimental group. The degree of dissatisfaction was higher than that of the control group (P ＜ 0.05). **Conclusion** Joint discussion on flipped classrooms. The theory-based CBL teaching method has significantly improved the quality of teaching and has made a significant contribution to the medical teaching model. The exploration has certain reference value and can guide the reform of medical teaching.

**Key words:** case-based teaching method; flipped classroom; teaching reform; Teaching evaluation ;medical theory; urology

**Introduction**

Medicine is related to human health and the future, and it is a subject that requires lifelong learning. Subject [1], thus improving students’ interest in learning and enhancing theoretical knowledge and practical skills. Being able to use abilities flexibly, improve independent learning abilities, and have the ability to unite and innovate are qualities that excellent medical students and doctors must possess. However, for a long time, our country's higher medical education mainly adopted a teacher-centred teaching method. Students passively accept knowledge, which is not conducive to the cultivation of comprehensive quality in medical students [2]. The State Council Office On Deepening Medical Education Collaboration and Further Promoting Medical Education Reform," issued by the Public Office and Development Opinions, aims to improve the quality of medical talent training. Therefore, this study adopts the flipped classroom joint discussion method in urology theory teaching. **Case-based learning (CBL)**, explore this effect of a new teaching model and student satisfaction.

**1 Materials and methods**

**1.1 General information**

Select the 2018 clinical medicine majors at Hebei North University and Lahore University from June to September 2021. Classes 1 to 4 of undergraduate students are the research subjects, and they are divided into experimental group and experimental group using random number table method.

Control group, 80 people in each group. There were 38 males and 42 females in the experimental group, with an average age of (20.15±1.21) years old; in the control group, there were 39 males and 41 females, with an average age of (20.23±0.96) years old. Comparison of age, gender, and educational background of the two groups of students. The difference is not statistically significant (P ≤ 0.05) and is comparable.

**1.2 Research methods**

Two groups of teachers and teaching hours (24 hours, 2 times a week, 4 hours each time), performance assessment, and questionnaire methods are all the same. Control group: Preview before class - Teacher's explanation in class - Students' review after class **Study:** the traditional teaching model of completing problems assigned by the teacher, mainly based on the teacher's explanation. Students mainly listen to lectures. Experimental group: adopt flipped classroom joint discussion CBL teaching method. Student randomly divided into 8 groups of 10 students each, with designated group leaders, and learning activities conducted in groups. 1) Teaching cases: In accordance with the requirements of the talent training plan, teaching syllabus, and teaching objectives, organise teachers to write appropriate cases. The cases should be close to life and clinical to show its reality; 4 to 6 cases are designed for each class, and the cases all have key issues.

**Questions**, at least 2 to 3 questions, and it should involve the current status and development direction of research related to this disease. Teachers connect the key and difficult points of the course through discussions to broaden students thinking and guide students to learn independently. For example: Male patient, 56 years old, due to I was hospitalised for 1 year with intermittent painless gross haematuria, Hb 105 g/L, B-ultrasound showed liver and gallbladder Write courseware: A 2.0 cm solid mass was seen on the left wall of the bladder in this patient.

What is the clinical diagnosis? What is the first test for this disease? Principles of treatment for this disease: What is it? How do I choose a technique? How should I take medication after surgery? 2) Write courseware: According to the requirements of the teaching syllabus, teachers focus on teaching objectives and combine teaching cases to compile Write courseware for students to preview before class, but the content of the courseware should not be limited to the syllabus. You can add multimedia materials, expand your knowledge, explain things in a simple way, and use various special features to Characteristic icons and pictures display teaching content to students, connect knowledge points, and make the lesson more convenient. The files are more vivid, focused, and rich in content, making it easier for students to preview and understand, improve their preview interest [3], and introduce relevant academic cutting-edge content. 3) Students learn independently before class; teachers will provide teaching cases and teaching courseware 2 weeks in advance. Send it to students for preview, requiring students to master key and difficult knowledge and prepare for problems that arise during study. Students first search for literature and read books to solve them. Decision, and then discuss within the group or seek help from teachers or teachers through the class communication group. Help from classmates. Each group can choose student representatives to collect and sort out the questions in the preview. Use this question as a guide as part of your class discussion. 4) Class time Arrangement: In class, teachers teach based on teaching cases and follow the order of questions. Representatives from each group reported case issues using PPT. After the report, each group discussed complementing each other, asking their own questions, and finally finding the correct answer; during this period, the teacher provides guidance and adds additional information to the key or difficult content that has not been explained to the students. To supplement, deepen the impression, and promote the internalisation of knowledge. At the same time, the ideological and political content of the course can be throughout it; it triggers students to think deeply. 5)

**After-class review**: Complete all after reading the teaching content of this section, the teacher guides the students to review the learning content of this section and Comment and summarise the performance of the class, affirm the students' achievements, and also point out the existing problems. The shortcomings of the teaching model can be identified step by step to improve the effectiveness of the teaching model.

**1.3 Observation indicators**

(1) Written test assessment: Objective questions check students’ mastery of basic theoretical knowledge; grasp the situation; ask subjective questions evaluate students’ clinical thinking ability through case analysis questions, etc. The full score is 100 points; the test question type and score distribution are objective questions with a total of 40 points (including multiple-choice questions, name explanations), and subjective questions total 60 points (including short answer questions, case analysis questions). Perform statistics and analysis on the number of people with high scores and the number of people who failed in the two groups: The number of people with high scores is the number of people with scores above 80 and above 90; the number of people who failed that is, the number of people below 60 points. The more people in high segments, the better, and vice versa. The larger the number of people in the group, the worse the learning effect within the group.

(2) Questionnaire: Anonymous questionnaire on satisfaction with teaching methods investigation. Content includes: independent learning ability, clinical thinking ability cultivation, analysis Ability to analyse and solve clinical problems, understanding and memory of knowledge points, and teamwork ability; teacher-student interaction; taking up spare time to increase learning burden; recognition of the teaching mode; selecting "yes" or "no" to answer.

**1.4 Statistical methods**

Specialists collected research data and used SPSS 19.0 statistical software to conduct the research.

For analysis and processing, the count data is expressed as n (%), and the χ2 test is performed to measure the data. Material based on (x-±s), perform a t test, and P < 0.05 means the difference is statistically significant.

**2 results**

**2.1 Comparison of test scores**

After statistics, it was shown that the total score and case analysis question scores of the experimental group were significantly higher. Higher than the control group, the difference was statistically significant (P < 0.05), see Table 1. At the same time, the proportion of patients with scores ≥ 80 and < 90 and ≥ 90 in the experimental group was significantly higher than that in the control group. The score <60 was significantly lower than that of the control group, see Table 2).

**2.2 Analysis of survey results**

After the course, the two groups distributed and recovered 160 questionnaires.

The effective recovery rate of the volume is 100%. The results of the questionnaire showed that compared with the control group, the experimental group in independent learning, clinical thinking ability cultivation, ability to analyse and solve clinical problems, understanding and memory of knowledge points, teamwork ability, teacher-student interaction, and recognition of the teaching mode is better than the control group, and the difference is statistically significant (P < 0.05); because the experimental group occupied their spare time and increased their study burden, the degree of dissatisfaction was higher than that of the control group, and the difference between the two groups was statistically significant (P < 0.05); see (Table 3).

College students are the main group that masters new technologies and new ideas in society.

High-quality talents cultivated by the state are the main group of people who promote social progress and the ability to learn independently and analyse and solve clinical problems through teamwork. It is the standard for qualified college students in the new era. In the era of network Informaionization, medical education. Education has also kept pace with the times, and a variety of teaching models have emerged. Flipped classroom, FC) subverts teacher teaching, Traditional teaching of students’ passive learning in the education model, students focus on self-study, teachers answer questions and solve doubts, and they follow the "student-cantered" approach to teaching philosophy, which leads to the exchange of roles between teachers and students and the diversity of teaching modes. Series of changes. Flipped classroom re-adjusts learning arrangements inside and outside the classroom. The initiative of learning is transferred from teachers to students, cultivating students' independent learning ability. Make learning more active and students more engaged [4]. Foreign research found that transferring classrooms can better stimulate students' independent learning ability, and students can take charge of their own learning. Rhythm, greater participation, and more authentic learning are currently applied in subjects such as pharmacy [5], physiology [6], and epidemiology [7]. Students first become independent. Learning is the first step in flipping the classroom. In the classroom, teachers and students complete the knowledge transfer process independently with students. The process of further internalisation of knowledge is completed through classroom discussions. However, due to the limited energy of teachers, they cannot take into account the lack of knowledge. Students who lack the ability to learn independently lead to a decline in teaching quality [8]. CBL teaches the study of law originated at Harvard University and revolves around real-life situations with no specific solutions. Cases inspire students to analyse, think and discuss, and apply them around the world in fields such as law, medicine, and business [9]. Compared with traditional teaching, teachers are more when designing motivating characters, lead students to participate in discussions. After the 1990s, CBL teaching methods have begun to be explored in clinical medicine and other fields, and students are no longer actively sued. Students know what to do, and students deepen their knowledge by actively consulting relevant information. Understanding, and transform knowledge into abilities through teamwork and other methods. Competencies are often skills that good doctors must possess [10]. Types of CBL Teaching Including lecture-based CBL teaching, discussion-based CBL teaching, and contextualised CBL teaching. Discussion-based CBL teaching is a commonly used teaching model. Teachers use relevant Compile or select appropriate cases based on knowledge points, and ask relevant questions based on the cases. Then conduct discussions within and between groups. The teacher mainly guides the discussion direction. This kind of the teaching model is highly motivated, has a strong sense of participation, and can also inspire Students think to master the relevant knowledge points of the disease [11]. The author will translate. Combining classroom transfer with discussion-based CBL teaching methods, the study concluded: the experimental group. The theoretical test score (91.52±4.78) was higher than that of the control group (83.76±3.52) divided.

**Table 1 Comparison of theoretical assessment scores of two groups of students (points, x - ±s）**

|  |  |  |
| --- | --- | --- |
| Group | Case analysis question scores | Overall score |
| Experimental Control group (n=80)  Experimental Control group (n=80)  t value  P value | 25.87±0.54  21.46±0.76  42.308  ＜ 0.05 | 91.52±4.78  83.76±3.52  11.692  ＜ 0.05 |

**Table 2 Comparison of the distribution of students' theoretical test scores between the two groups [ Name (%)]**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Constituencies | < 60 points | ≥ 60 points and < 70 points | ≥ 70 points and < 80 points | ≥ 80 and < 90 points | ≥ 90 points |
| Experimental group (n=80)  Control group (n=80)  χ2 value  General value | 0  5（6.25）  **\_**  ＞ 0.05 | 14（17.50）  24（30.00）  3.451  ＞ 0.05 | 22（27.50）  34（42.50）  3.956  ＜ 0.05 | 29（36.25）  12（15.00）  9.477  ＜ 0.05 | 15（18.75）  5（6.25）  5.714  ＜ 0.05 |

**Table 3 Comparison of students' satisfaction with teaching [ Name (%)]**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Constituencies** | **Improve self-**  **directed learning** | **Strengthen the clinic**  **Thinkingskills training** | **Improve analysis and resolution**  **Ability to do clinical problems** | **Strengthen the understanding and memorization of knowledge points** | **Strengthen the team**  **Ability to collaborate** | **Strengthen teachers and students**  **interaction** | **Acknowledging the teaching**  **mode** | **occupies spare time,**  **Increase the study load** |
| **Experimental group (n=80)**  **Control group (n=80)**  **χ2 value**  **General value** | **72（90.00）**  **56（70.00）**  **10.000**  **＜ 0.05** | **75（93.75）**  **61（76.25）**  **9.608**  **＜ 0.05** | **78（97.50））**  **60（75.00）**  **17.075**  **＜ 0.05** | **76（95.00）**  **58（72.50）**  **14.879**  **＜ 0.05** | **75（93.75）**  **60（75.00）**  **10.667**  **＜ 0.05** | **74（92.50）**  **59（73.75）**  **10.025**  **＜ 0.05** | **76（95.00）**  **60（75.00）**  **12.549**  **＜ 0.05** | **57（71.25）**  **40（50.00）**  **7.567**  **＜ 0.05** |

The difference was statistically significant (P < 0.05). The scores of the experimental group (25.87±0.54) were higher than those of the control group (21.46±0.76), and the difference was statistically significant (P < 0.05). In addition, the number of test scores ≥ 80 and < 90 and ≥ 90 in the experimental group was higher than that in the control group, and the difference was statistically significant (P < 0.05). < 60 points, ≥ 60 points, and < 70 points, there was no significant difference between the experimental group and the control group (P > 0.05). Through self-study, repeated discussion and thinking, and teacher supplementation, students have a deeper understanding of key and difficult knowledge and improve their ability to understand cases, analyse problems, solve clinical problems, and think clinically.

More flexibility in the application of knowledge. In the teaching satisfaction survey, the dissatisfaction of the students in the experimental group was higher than that of the control group in terms of occupying spare time and increasing the learning burden, which indicated that the students' self-directed learning ability was not good and needed to be improved, which is also a common weakness of college students in China at present, which is not unrelated to the previous "cramming" teaching [12], and the teaching reform should not be abandoned because of the dissatisfaction caused by this aspect. With the extensive and in-depth advancement of education reform, when self-learning ability becomes a habit of college students, this dissatisfaction will gradually decrease [13]. The combination of the flipped classroom and the discussion-based CBL teaching method can organically combine their advantages and improve the teaching effect more significantly, so that students' comprehensive ability can be comprehensively improved [14].

In the process of CBL teaching, more attention is paid to two-way communication, and the process of discussion is anytime and anywhere, which requires teachers to constantly think, carefully plan, and summarise, which puts forward higher requirements for teachers. Teachers need to prepare cases in advance, which should be objective and vivid, and the results should be complex and varied. Teachers should correctly guide students' problems and discussions in teaching, change the teaching form, brainstorm ideas, and make timely adjustments to meet the needs of teaching [15].

**Conclusion:**

The results of this study suggest that the application of the flipped classroom and discussion-based CBL teaching method in the study of urology theory is significantly improved compared with the traditional teaching method in improving teaching effectiveness and student satisfaction. The flipped classroom joint discussion CBL teaching method is worthy of further application and exploration in clinical teaching.

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**References**

1. Yin Ziyu, Wu Tafan, Ma Jinxiang. An Empirical Study on the Construction of a Lifelong Learning Ability Index System for Medical Students [J]. Zhejiang Medical Education, 2022, 321(2): 65-72.
2. Liu Bing, Qi Dianjun . PBL-based flipped classroom teaching in local anatomy teaching [J]. Journal of Anatomy Research, 2019, 41(6): 535-538.
3. Xu Qin, Liu Liyun, Zhang Yuexin . Application of case-based "flipped classroom" in infectious disease teaching [J]. Chinese Journal of Continuing Medical Education,2018,10 (30):31-34.
4. Wang Zhengjia, Liu Li, Wang Xiaobin . Application and Effect Analysis of Flipped Teaching Combined with Micro-course in Clinical Teaching of Anesthesiology [J]. Education and Teaching Forum, 2020(41):130-132.
5. SABA M，METRY I，LUCAS C，et al. Evaluation of a flipped examination model implemented in a final-year undergraduate pharmacotherapeutics course[J]. Am J Pharm Educ，2019，83（3）：6568.
6. ZANTE B，HAUTZ W E，SCHEFOLD J C. Physiology education for intensive care medicine residents： a 15-minute interactive peer-led flipped classroom session[J]. PLoS One，2020，15（1）：e0228257.
7. SHIAU S，KAHN L G，PLATT J，et al. Evaluation of a flipped classroom approach to learning introductory epidemiology[J]. BMC Med Educ，2018，18（1）：63.
8. Zhao Quchuan, Chi Tianyu, Wang Yajun . Research on the Application of Problem-oriented Flipped Classroom in the Teaching of Digestive Endoscopy Theory [J]. Chinese Journal of Cases, 2021,22(4):81-83.
9. REN Haigang,CHEN Yan . On the Implementation Characteristics and Precautions of CBL Teaching Method in Pharmacology Teaching [J]. Education and Teaching Forum, 2019(48): 206-207.
10. WANG Wei, YU Jia, LI Donghang, et al . Experience of case teaching method in the teaching of thoracic surgery [J]. Continuing Medical Education, 2020, 34(2): 59-61.
11. Pons, Zheng Xiangxiang . Application of case teaching in cardiovascular disease course [J]. Education and Teaching Forum, 2019(52): 182-183.
12. FANG Bo,XUMingxia,ZHANG Jing . Application of flipped classroom combined micro-course teaching method in five-year anesthesia clinical teaching [J]. Chinese Journal of Continuing Medical Education, 2018,10(11):9-11.
13. Wang Lina, Liu Shuo, The Role of Case Teaching and Flipped Classroom in the Experimental Teaching Reform of Oral Medicine [J]. China Continuing Medical Education, 2021, 13(33): 1-4.
14. Liu Fang, Xu Jiajun, Lin Haiyan, et al. Application of flipped classroom in experimental teaching of nervous system anatomy [J]. China Higher Medical Education, 2019 (8): 70-71.
15. Ding Zhaoxi, Feng Lei, et al. Application of Case-Guided Flipped Classroom in Neuroanatomy Blended Teaching [J]. AAS,2021, 52(3):485-488