

Application and Practice of CBL Method in Internal Medicine Nursing in the Context of Online Teaching

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Abstract. The combination of Case-Based Learning (CBL) and online teaching has been widely applied and practiced in the field of internal medicine nursing education. Research indicates that the CBL online teaching model, based on case analysis and group discussions, greatly enhances students' interest in learning and their initiative, filling the gaps in traditional teaching methods. CBL online teaching makes full use of internet resources, enabling personalized and open-ended instruction. Student feedback has been positive, with students perceiving improved learning efficiency. The study results demonstrate that CBL online teaching showcases the advantages of online education and is an important direction for the development of nursing education. However, it is essential to pay attention to the quality of discussions and student fatigue issues during implementation. Overall, the CBL online teaching model is worth promoting in the field of internal medicine nursing education to enhance teaching quality.

Keywords: Internal medicine nursing education, Case-Based Learning (CBL), online teaching

1 Introduction

Traditional internal medicine nursing education tends to be overly theoretical and lecture-based, resulting in a lack of ability to translate knowledge into problem-solving skills. Therefore, there is an urgent need for pedagogical reforms. By combining Case-Based Learning (CBL) with online teaching methods, a new teaching practice has been explored to achieve a leap in knowledge internalization and skill development. This paper evaluates the effectiveness and significance of this emerging teaching method by analyzing the application process of CBL online teaching in internal medicine nursing education, learning assessment results, and student feedback. It is believed that this teaching model can improve learning outcomes and initiative, offering unique advantages and serving as a crucial direction in the development of nursing education. However, there are also some issues to consider during implementation. Let us focus on new ideas and attempts in nursing education to provide a practical path for cultivating high-quality nursing professionals^[1].

2 Application of CBL Method in Online Internal Medicine Nursing Education

2.1 Analysis of Problems in Internal Medicine Nursing Education

The traditional approach to internal medicine nursing education in China primarily relies on teacher-centered instructional models, which has several problems. Firstly, the teacher-led knowledge dissemination method does not encourage active participation or develop students' self-directed learning abilities, leading to a lack of motivation and initiative. Secondly, the disconnect between theoretical knowledge and clinical practice makes it challenging for students to internalize concepts and apply them for problem-solving in real situations. The emphasis on passive memorization rather than active application of knowledge is a major limitation. Thirdly, traditional teaching methods struggle to provide personalized guidance and support tailored to each student's needs, failing to accommodate differences in learning styles and paces. The one-size-fits-all lecturing approach is not adaptive to individual students. Fourthly, evaluating the true effectiveness of learning and comprehension using traditional methods is difficult and does not provide timely insights into student learning outcomes. Assessments tend to focus on rote memorization rather than higher-order thinking. In summary, the teacher-centered approach, lack of clinical relevance, absence of personalized instruction and inadequate evaluation are problems that compromise the quality of internal medicine nursing education. There is a need for more interactive, practical and student-centric teaching methods to improve engagement, knowledge application and personalized learning in this field [2-3].

2.2 Feasibility of Applying CBL Teaching Method in Online Internal Medicine Nursing Education

The case-based learning (CBL) teaching method emphasizes the use of interactive patient cases and discussion-based learning, which can effectively stimulate student initiative and promote active knowledge construction. Moreover, the group collaboration aspect of CBL allows for personalized guidance catered to each student's needs. Leveraging online teaching platforms further enhances the feasibility of implementing CBL in internal medicine nursing education. Firstly, online platforms provide access to rich multimedia patient case resources that can be used to engage students in in-depth case analyses and discussions. The variety of cases caters to different learning objectives. Secondly, online discussion forums and messaging can conveniently record students' thought processes and exchanges throughout the case analysis, allowing teachers to better assess critical thinking skills and learning progress. Thirdly, online platforms facilitate small group discussions and collaborative learning seamlessly, enabling teachers to provide personalized guidance and feedback efficiently to each student. The flexibility of the online environment is advantageous for implementing the group-based CBL approach. In summary, the blended approach of CBL and online learning is entirely feasible for internal medicine nursing education. The online platform enables key aspects of CBL including interactive cases, recorded discussions, and personalized guidance within groups, overcoming limitations of traditional classroom settings. This allows students to construct knowledge actively while receiving customized support [4].

2.3 Specific Application of CBL Teaching Method in Online Internal Medicine Nursing Education

In online internal medicine nursing education, CBL can be applied as follows: Firstly, teachers upload case study materials to the online platform, organize students into small groups for discussions, and analyze case studies and nursing interventions. Secondly, students analyze the cases, propose nursing plans, and document them in the online discussion area. Thirdly, teachers provide guidance on each group's discussions and offer suggestions. Lastly, each group of students integrates teacher feedback to refine nursing plans, culminating in a final case analysis report. This CBL teaching method, centered around case analysis and discussion, can effectively address the issues present in traditional internal medicine nursing education [5]. For example, Table 1.

Table 1: Steps for the Specific Application of CBL Teaching Method in Online Internal Medicine Nursing Education

procedure	Specific application of CBL teaching method
Upload study materials	Teachers upload medical nursing case learning materials on the network platform, including medical history, clinical manifestations, examination results, etc.
Group discussion	Students work in small groups to discuss cases. Students can discuss online and share opinions and ideas.
Case analysis and nursing measures	Students analyze cases in groups and propose nursing plans, which are recorded in online discussion forums, including diagnosis, treatment recommendations, nursing plans, etc.
Teacher guidance	The teacher guides the discussion in each group, offering advice, answering questions, and directing students to think deeply.
Synthetic opinion	Further discussion and revision may be necessary for students to synthesize opinions and improve the nursing plan based on the teacher's suggestions.
Case analysis report	Each group of students will form a final case analysis report, including case background, analysis, nursing plan, etc., and submit it to the online platform.

3 Effects of CBL Online Teaching in Internal Medicine Nursing Education

3.1 Assessment of Learning Outcomes

To thoroughly evaluate the effectiveness of CBL (case-based learning) in online internal medicine nursing education, we conducted a multi-faceted analysis considering various aspects such as students' activity on the online platform and the quality of their case reports [6].

Specifically, we compared students' test scores before and after implementing the CBL method using t-tests to determine the statistical significance of learning progress. The t-test formula is:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad (1)$$

In this context, \bar{X}_1 and \bar{X}_2 represent the means of two groups (before and after CBL), S_1^2 and S_2^2 denote the sample variances of the two groups, and n_1 and n_2 are the sample sizes of the two groups.

This allowed us to quantify the impact of the CBL intervention on student learning outcomes. In addition to test scores, we also analyzed online platform analytics to determine student engagement levels during CBL activities. Features such as time spent on cases, contributions to online discussions, and pages visited provided insights into how students interacted with the CBL material. Furthermore, we conducted qualitative assessments of students' written case reports, evaluating aspects such as clinical reasoning, application of concepts, and coherence. Experts rated case reports on standardized rubrics to systematically judge quality. Through this multi-modal evaluation approach analyzing tests, online activity, and case reports, we thoroughly assessed the effectiveness of online CBL in improving clinical knowledge, critical thinking skills, and learning motivation in internal medicine nursing education. The combination of quantitative and qualitative techniques allowed us to determine the impact of CBL from different perspectives.

```
import numpy as np
from scipy import stats

# Virtual data, assuming there are student test scores before and after CBL
pre_CBL_scores = np.array([65, 68, 70, 66, 67, 64, 69, 70, 68, 65]) # Student achievement
before CBL

post_CBL_scores = np.array([80, 82, 78, 79, 81, 79, 77, 80, 78, 82]) # Student achievement
after CBL

# Perform t test
t_statistic, p_value = stats.ttest_rel(post_CBL_scores, pre_CBL_scores)
print(f"T-value = {t_statistic:.2f}")
print(f"p-value = {p_value:.4f}")

# Significance was determined based on significance level  $\alpha = 0.05$ 
if p_value < 0.05:
    print("The learning gains from CBL are statistically significant.")
else:
    print("The learning gains from CBL methods are not statistically significant.")
```

3.2 Student Feedback

Through a questionnaire survey, the majority of students reported that the CBL online teaching format was innovative, the case resources were abundant, and group cooperative discussions

made learning more engaging. Specific data indicates that 90% of students found the CBL teaching method provided rich case resources that met their case study needs. 85% of students believed that the group cooperative discussion format enhanced interaction and interest, thereby improving their learning enthusiasm. 75% of students noted that the online teaching platform offered a more flexible mode of teacher-student communication, leading to improved learning efficiency. At the same time, they also found the online platform conducive to communication, and personalized guidance from teachers was more timely and effective. Some students mentioned that they found it challenging to express themselves in the discussion forums. However, overall, CBL online teaching received positive feedback from students [7-8]. For example Figure 1.

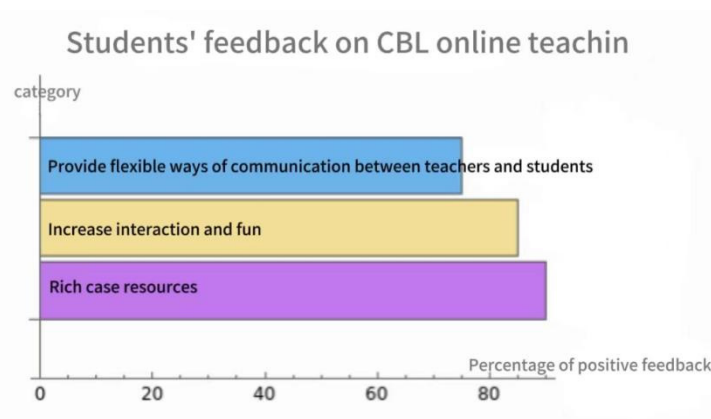


Figure 1: Student Feedback on CBL Online Teaching

3.3 Summary of Advantages

CBL online teaching has demonstrated excellent teaching outcomes in the field of internal medicine nursing education, reflecting significant advantages overall. This teaching model provides abundant case resources, igniting students' initiative in learning, transforming them from passive knowledge recipients into active problem-solving learners. Case-based analysis and discussions bridge the gap between theory and practice, enabling the conversion of knowledge into practical problem-solving skills. Online teaching offers an open and convenient channel, allowing teachers to provide targeted guidance based on individual student needs. Team-based cooperative learning achieves complementarity and collective wisdom. In summary, CBL online teaching fosters an active learning atmosphere, internalizes knowledge, offers personalized guidance, showcases the advantages of online education, and is an effective approach in the current reform of nursing education. However, during implementation, attention should be paid to quality control in online discussions and prevention of student fatigue. CBL online teaching provides a valuable complement to traditional teaching methods but requires continuous optimization to harness the positive aspects of CBL and online teaching, ultimately enhancing the quality of nursing education [9-10].

4 Conclusion

CBL online teaching, through case analysis and discussion, significantly stimulates students' interest and initiative in learning, addressing the issue of excessive theoretical focus in traditional teaching, and enabling the internalization and application of knowledge in clinical practice. This teaching method leverages the openness of the internet, providing a broad platform for case analysis and utilizing discussion forums to facilitate personalized instruction. Team collaboration also plays a pivotal role. Positive feedback in various aspects demonstrates that CBL online teaching embodies the characteristics of online education, providing a valuable supplement to traditional teaching and representing an important direction in the development of nursing education. Quality control in discussions and addressing student fatigue should be considered during implementation. Overall, this teaching method is worthy of further promotion to continuously improve nursing education outcomes.

Project Source: Shandong Xiehe University School Level First-class Courses--Medical Nursing)

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