

# Exploring the Efficacy of Problem-Based Learning (PBL) in Clinical Gastroenterology Education

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**Abstract:** *Purpose:* To explore and analyze the effectiveness of the problem-based learning (PBL) model in clinical gastroenterology education. *Methods:* This study involved 40 postgraduate gastroenterology students from January 2020 to December 2021, who were randomly assigned to two groups using the random number table method: a control group ( $n = 20$ ) receiving conventional teaching and a research group ( $n = 20$ ) receiving the PBL model. The teaching outcomes of both groups were compared and analyzed. *Results:* The research group exhibited significantly high scores in both theoretical and practical examinations compared to the control group ( $P < 0.05$ ). Moreover, the satisfaction levels of the trainees in the research group with the teaching model were significantly greater than those in the control group ( $P < 0.05$ ). *Conclusion:* In the realm of clinical gastroenterology education, the PBL model proves to be an effective method for enhancing the theoretical and practical performance of postgraduate trainees. Furthermore, it garners high levels of satisfaction among students, underscoring its clear clinical value.

**Keywords:** Clinical gastroenterology education; Problem-based learning (PBL); Assessment results; Teaching satisfaction

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## 1. Introduction

In the era of the knowledge economy and social informatization, the demand for medical education has been steadily increasing. Gastroenterology, as a clinical specialty, encompasses a wide array of diseases, exhibits high diagnostic complexity, and serves a vast patient population, necessitating exceptional clinical expertise from healthcare practitioners. Consequently, there has been a growing emphasis on elevating the standards of clinical education in the field of gastroenterology.

Several foreign medical schools have incorporated problem-based learning (PBL) into their educational programs. In this approach, instructors present problems as the core learning content, encouraging students to collaboratively explore and resolve them. Subsequently, students seek answers through literature research, expert consultations, and other methods, followed by classroom discussions. This teaching method has the

potential to ignite students' enthusiasm for learning, and enhance their skills in expression, learning, information retrieval, and logical thinking, ultimately fostering the development of competent medical professionals <sup>[1]</sup>.

This research aims to investigate the significance of employing the problem-based learning style in the context of clinical gastroenterology education.

## **2. General information and methods**

### **2.1. General information**

Between January 2020 and December 2021, a total of 40 postgraduate interns in the Department of Gastroenterology were randomly assigned to two groups. The control group comprised 14 females and 6 males, with an average age of  $24.19 \pm 2.11$  years, while the research group included 16 females and 4 males, with an average age of  $24.23 \pm 2.13$  years. Baseline information collected before the study showed no significant differences between the groups ( $P > 0.05$ ).

### **2.2. Research method**

In the control group, 20 participants received traditional instruction. Their instructor introduced the content, timing, plan, and objectives of the apprenticeship upon entering the ward. The instructor guided graduate students through patient assessments and immediate reviews of medical records. Students then gathered in the classroom to discuss key knowledge points related to patients' conditions, as presented by the instructor.

The 20 students in the research group adopted the PBL approach to learning. The teaching faculty used key gastroenterology diseases from the Clinical Teaching Program as a foundation for comparing with real cases. During clinical diagnosis and assessment, clinical signs, symptoms, treatment, and imaging data were summarized. Students were quizzed on crucial learning points, and integrated imaging data summarized essential knowledge for postgraduate interns. Relevant questioning emphasized critical knowledge areas to promote a deep understanding of the material.

Interns applied their acquired knowledge to analyze practical information in various teams, discussing and proposing solutions to problems. A spokesperson from each group presented their findings, with other interns supplementing answers based on their own understanding. Communication with instructors occurred through WeChat and QQ groups for in-depth discussions of problematic areas.

During the teaching period, postgraduate trainees independently addressed various gastroenterology issues, including managing rare diseases, identifying commonly misdiagnosed illnesses, and considering treatment options. This fostered a comprehensive understanding of gastroenterology treatment and provided practical experience. Instructors offered summaries for each problem, introduced relevant case studies, identified key points and challenges, and facilitated comprehension and retention through group discussions and independent thinking.

### **2.3. Research indicators**

This study designed theoretical and practical operation assessment questionnaires, with a maximum score of 100 points <sup>[2]</sup>. Additionally, anonymous online surveys using self-made questionnaires measured satisfaction with the teaching mode, categorized as satisfactory, general, or unsatisfactory <sup>[3]</sup>.

### **2.4. Statistical analysis**

Statistical analysis was conducted using SPSS 21.0 software as the data processing tool. Count data is expressed as percentages (%), and the  $\chi^2$  test is used for calculations. Measurement data is presented as mean  $\pm$  standard

deviation (SD), and the *t*-test is employed for calculations. Statistical significance is indicated by a *P*-value of less than 0.05.

### 3. Results

#### 3.1. Comparison of theoretical and practical operation assessment scores between the two groups

In **Table 1**, the theoretical and practical operation assessment scores of the research group were higher than those of the control group ( $P < 0.05$ ).

**Table 1.** Comparison of theoretical and practical operation assessment scores between the two groups (points in mean  $\pm$  SD)

	Theoretical assessment results	Practical examination results
Research group ( $n = 20$ )	88.25 $\pm$ 1.02	87.31 $\pm$ 1.05
Control group ( $n = 20$ )	76.22 $\pm$ 1.45	75.45 $\pm$ 1.36
<i>t</i> -value	12.5682	10.4587
<i>P</i> -value	< 0.05	< 0.05

#### 3.2. Comparison of satisfaction with teaching models between the two groups

**Table 2** demonstrates that the intern doctors in the research group expressed higher satisfaction with the teaching mode compared to the control group ( $P < 0.05$ ).

**Table 2.** Comparison of satisfaction with the teaching models between the two groups [ $n$  (%)]

	Satisfactory	General	Unsatisfactory	Satisfaction
Research group ( $n = 20$ )	8 (40.00)	11 (55.00)	1 (5.00)	19 (95.00)
Control group ( $n = 20$ )	3 (15.00)	10 (50.00)	7 (35.00)	13 (65.00)
$\chi^2$	-	-	-	5.6682
<i>P</i> -value	-	-	-	< 0.05

### 4. Discussion

Gastroenterology is a significant field with a vast number of patients and a diverse range of complex diseases and etiologies, making clinical diagnosis and treatment intricate. Clinical teaching in this field is highly practical. Therefore, it is essential to employ appropriate teaching methods during clinical internships to help postgraduate students effectively bridge the gap between theory and practice.

In clinical teaching, it is common for instructors to collaborate with graduate interns during clinical internships because the busy clinical schedule limits the instructor's guidance time. Graduate interns often follow the instructor's instructions, which can hinder their ability to effectively integrate theoretical knowledge with practical internship work, potentially leading to suboptimal teaching outcomes<sup>[4]</sup>. Problem-based learning offers an innovative educational approach in medical education that enhances interns' problem-solving skills and practical proficiency, enabling them to acquire relevant knowledge and experience more effectively<sup>[5]</sup>.

The study revealed that the research group outperformed the control group in both theoretical and practical operation assessments ( $P < 0.05$ ). Furthermore, trainees in the research group expressed higher satisfaction

with the teaching mode compared to the control group ( $P < 0.05$ ). Problem-based learning has successfully transformed the traditional one-dimensional teaching model by placing trainee students at the core of the learning process. It prioritizes the development of practical skills and makes problem-solving the primary teaching approach. Encouraging trainee students to independently explore and address challenges ensures the achievement of set learning objectives. Problem-based learning methods are increasingly employed in contemporary clinical teaching, particularly in medical and surgical clinical practical training <sup>[6]</sup>.

The problem-based learning method revolved around facilitating active learning for postgraduate students by presenting significant problem scenarios to convey the content and purpose of the study. This approach encourages students to engage proactively in the problem-solving process, fostering their ability to learn and independently address issues.

In conclusion, the problem-based learning approach to teaching has proven to be effective in enhancing the theoretical and practical competence of postgraduate students studying gastroenterology. It garners high levels of satisfaction and holds significant clinical value.

## Disclosure statement

The authors declare no conflict of interest.

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