



## Integrating outcome-based education and case-based clinical reasoning: Enhancing competency development in rehabilitation medicine education

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### Abstract

**Purpose:** This study aimed to investigate the effectiveness of combining these two teaching approaches in improving students' learning outcomes and clinical reasoning abilities.

**Method:** A quasi-experimental study was conducted with two groups of rehabilitation medicine students. The experimental group received instruction integrating OBE principles with CBCR methods, while the control group followed traditional teaching methods. Pre- and post-intervention assessments were administered to evaluate students' knowledge, clinical reasoning skills, and self-perceived competencies. Results showed that students in the experimental group demonstrated significantly higher scores in knowledge acquisition, clinical reasoning abilities, and self-reported competency levels compared to the control group. Qualitative feedback from students and instructors further revealed increased engagement, motivation, and application of knowledge to real-world scenarios.

**Conclusion:** Integrating OBE and CBCR approaches in rehabilitation medicine education effectively enhances student learning outcomes, clinical reasoning skills, and perceived competencies. This study highlights the potential benefits of implementing such combined teaching strategies to prepare future rehabilitation professionals better.

**Keywords:** Outcomes-based education, case-based clinical reasoning, rehabilitation medicine education, competency development, teaching approaches

### Introduction

Outcomes-based education (OBE) is a learner-centered educational philosophy that clearly defines the desired learning outcomes and designs instructional activities to facilitate students' attainment of those intended outcomes. In medical education, OBE ensures that students acquire the necessary knowledge, skills, and attitudes to be well-prepared for future clinical practice<sup>[1]</sup>. It emphasizes the close connection between medical education and clinical practice, maintaining a high alignment between the taught content and the work requirements. By concentrating on the expected competencies and professional proficiencies, OBE aids in cultivating healthcare professionals with the required qualities.

Case-based clinical reasoning (CBCR) is a teaching approach grounded in authentic clinical cases. It simulates real-life scenarios to help students develop abilities in diagnosing and managing complex medical problems<sup>[2]</sup>. During the CBCR process, students gather relevant information, analyze data, formulate hypotheses, and validate them to arrive at reasonable diagnoses and treatment plans<sup>[3]</sup>. This active learning and critical thinking process reinforces theoretical knowledge and fosters students' clinical reasoning skills. CBCR also enhances students' communication abilities, teamwork spirit, and professional demeanor, preparing them for future clinical work<sup>[4]</sup>.

Integrating OBE and CBCR can create a synergistic effect, optimizing the quality and effectiveness of medical education. OBE provides a clear learning objective orientation for CBCR<sup>[3]</sup>, while CBCR offers a practical pathway to achieve the intended learning outcomes of OBE<sup>[5]</sup>. By combining these two teaching approaches, educators can design instructional activities grounded in real-world scenarios and aimed at cultivating the required

competencies, enabling students to actively construct knowledge and develop necessary clinical skills in simulated clinical contexts<sup>[6]</sup>. This integrated approach helps ensure that medical education produces high-quality healthcare professionals capable of meeting societal demands.

### Purpose

The primary objective of this research is to evaluate the effectiveness of integrating outcomes-based education (OBE) and case-based clinical reasoning (CBCR) approaches in rehabilitation medicine education. Specifically, the study aims to empirically validate whether this integrated teaching model can significantly enhance students' learning performance and clinical reasoning abilities. By comparing the performance differences between the experimental and control groups, the study can clearly understand the facilitative role of the integrated approach in competency development.

Additionally, the research aims to explore the impact of integrating OBE and CBCR on students' learning experiences, engagement, and self-efficacy. By collecting student feedback and self-evaluation data, the study can explore whether this innovative teaching approach improves students' learning motivation and self-perceived competency levels, providing a basis for designing optimized course instructional activities.

Finally, the study will summarize the challenges and suggestions encountered by teachers and students during implementing the integrated teaching approach. Through analyzing survey and interview data, the study can identify deficiencies in the implementation process and propose improvement measures, laying a foundation for the broader promotion of this model in future teaching practices.

## Research Methods

This study employed a quasi-experimental research design. The research subjects were divided into an experimental group and a control group. The experimental group received instructional interventions integrating outcomes-based education (OBE) and case-based clinical reasoning (CBCR), while the control group received traditional teaching methods. The effectiveness of the integrated teaching approach was evaluated by comparing the performance changes of the two groups before and after the intervention.

## Research Results

### 1. Changes in Students' Learning Achievements/Abilities

Students in the experimental group significantly outperformed the control group in both theoretical knowledge tests and clinical reasoning ability assessments. The average scores of the experimental group were higher than the control group, respectively. This indicates that the integrated OBE and CBCR teaching approach notably promotes students' knowledge acquisition and clinical reasoning development. Notably, the performance of the experimental group students was particularly outstanding in clinical application tasks, such as case analysis and formulation of diagnostic plans.

The students' self-evaluated competency levels also reflected similar results. The average self-evaluation score of the experimental group was higher than that of the control group, which had a higher level of self-confidence, especially in clinical decision-making and problem-solving abilities. This enhancement in self-perception is consistent with the objective test results, further validating the superiority of the integrated teaching model.

### 2. Student Satisfaction and Feedback

Most students in the experimental group expressed satisfaction with the integrated OBE and CBCR teaching approach. They believed vivid case-based teaching was more closely aligned with practice and helpful in applying theoretical knowledge to solve practical problems. Students reported that group discussions and simulation exercises provided positive learning experiences, better cultivating their clinical thinking and decision-making abilities.

However, a few students also noted that the clinical cases were relatively complex, and the teaching intensity was high, posing specific challenges. They suggested appropriately reducing the workload in the teaching arrangements and strengthening the review and reinforcement of theoretical knowledge.

### 3. Teacher Feedback

The instructors acknowledged the overall effectiveness of the integrated teaching model. They observed that by adopting OBE to clarify teaching objectives and combining CBCR with authentic case-based teaching, students acquired a solid theoretical foundation and developed the ability to analyze and solve complex clinical problems.

At the same time, the teachers also pointed out some challenges encountered during the implementation process, such as the time-consuming and laborious task of creating high-quality case-based teaching resources and the need for more preparation and experience in organizing and guiding students' case discussions. Despite the increased workload, the significant improvement in students' abilities made the effort worthwhile.

## 4. Challenges Encountered During Implementation

In addition to the challenges mentioned by teachers and students, researchers encountered the following issues during the implementation of the integrated teaching approach:

Firstly, integrating OBE principles with CBCR teaching and forming a coherent teaching system required considerable effort, as establishing a scientific and reasonable curriculum structure took much work.

Secondly, implementing CBCR teaching placed high demands on the faculty's expertise. Teachers must possess solid theoretical knowledge, extensive clinical experience, and flexible teaching skills to organize high-quality case-based teaching activities.

Furthermore, the development and updating of case resources and the preparation of teaching equipment and facilities were also limiting factors. Some high-fidelity simulation training facilities still need further improvement. Finally, continuous feedback collection and optimization were necessary after implementing the integrated teaching model. This is an ongoing process of exploration and improvement.

## Conclusion

### 1. Analysis of Results

The results of this study demonstrate that the integrated teaching model combining outcomes-based education (OBE) and case-based clinical reasoning (CBCR) can significantly improve rehabilitation medicine students' learning achievements and clinical reasoning abilities [7]. Not only did the experimental group students perform exceptionally in knowledge acquisition and ability assessments, but they also showed a significant enhancement in their self-evaluated competency levels. These findings are consistent with existing research, further validating the positive impact of effectively integrating the two teaching methods on promoting learning outcomes and competency development.

Notably, the outstanding performance of the experimental group students in clinical application tasks reflects the strength of the CBCR teaching approach. By simulating real-world clinical scenarios, students could apply their acquired knowledge in diagnostic analysis and decision-making, effectively fostering their clinical thinking and problem-solving abilities [8]. Meanwhile, OBE provided a clear learning objective orientation for CBCR, ensuring the instructional activities aligned with the intended competencies. The two approaches complemented each other, producing a synergistic effect [9].

### 2. Evaluation of Pros and Cons

The primary advantage of the integrated OBE and CBCR teaching model lies in its practical relevance and emphasis on competency development. Through authentic case-based teaching, students actively learned and constructed knowledge in simulated clinical environments [10], mastering theoretical foundations and gaining hands-on experience in solving complex problems [11]. This engaging teaching approach enhances learning motivation and engagement while cultivating clinical thinking habits [12].

However, this model also has certain drawbacks, such as the need for substantial teaching resources, increased workload, and higher demands on faculty expertise. Developing high-quality case-based teaching materials and organizing and

guiding students' discussions and practices require significant instructor effort. Additionally, the integration poses challenges in curriculum system design.

### 3. Research Limitations

The main limitations of this study lie in the relatively small sample size and short period. The research subjects were drawn from a single institution to ensure comparability between the experimental and control groups, leading to a smaller scale. Moreover, the limited study duration made observing long-term changes in students' competency development challenging. Future research should expand the sample size and extend the follow-up period to obtain more compelling conclusions.

Furthermore, this study primarily relied on quantitative tests and surveys for data collection, with limited qualitative analysis. Future studies could incorporate multi-perspective, multi-method qualitative research to gain deeper insights into the integrated teaching approach's specific implementation and influencing factors.

### 4. Implications for Future Teaching

Despite its shortcomings, the findings of this study provide valuable insights for future curriculum and instructional reforms in rehabilitation medicine and other medical specialties:

1. The feasibility and value of integrating advanced educational philosophies and teaching methods, such as OBE and CBCR, have been further validated.
2. Designing curriculum systems that align with OBE principles and emphasize the development of core competencies like clinical reasoning is a growing trend.
3. Successful implementation is crucial to Establishing a high-quality faculty, developing teaching resources, and building hardware facilities.

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