

Case-Based Learning and Problem-Based Learning in Undergraduate Medical Education:

A Comparative Review

Prepared for medical education colleagues teaching undergraduate curricula

1. Introduction

Case-based learning (CBL) and problem-based learning (PBL) are both small-group, learner-centred teaching/learning methods that use a clinical scenario as the starting point for learning. Because of this shared surface structure, the two are frequently used interchangeably in curriculum documents and informal conversation. However, the foundational literature treats them as distinct points on a spectrum of guided-to-open inquiry (Barrows, 1986; Srinivasan et al., 2007), with different implications for student autonomy, facilitator role, and resource demands. This document summarises the peer-reviewed literature distinguishing the two, to support precise terminology in curriculum design and cross-institutional communication.

2. Definitions

2.1 Case-Based Learning (CBL)

CBL is a guided-inquiry teaching/learning method in which students work through a structured clinical case, typically with a defined set of questions, to apply and integrate previously introduced knowledge (Kim et al., 2006; Thistlethwaite et al., 2012). The facilitator actively steers discussion toward pre-specified learning outcomes, and case information is substantially provided by the case author rather than sought out independently by students (Srinivasan et al., 2007).

2.2 Problem-Based Learning (PBL)

PBL is an open-inquiry method in which students are presented with an unfamiliar, deliberately under-specified problem and must identify their own learning issues, then research and construct the relevant knowledge largely independently before returning to apply it to the problem (Barrows, 1986). Barrows' influential taxonomy situates PBL on a continuum from wholly teacher-directed instruction to fully student-directed inquiry, noting that the term "problem-based learning" itself covers a wide range of methods depending on how much structure and content the tutor supplies (Barrows, 1986).

3. Comparative Summary

The table below summarises the principal points of divergence between the two methods, drawing substantially on Srinivasan et al.'s (2007) direct two-institution comparison, which remains the most widely cited empirical study contrasting PBL and CBL in medical education.

Dimension	Case-Based Learning (CBL)	Problem-Based Learning (PBL)
Primary purpose	Teaching/learning method to apply and integrate knowledge to a clinical case, developing clinical reasoning within a defined content area (Kim et al., 2006; Thistlethwaite et al., 2012).	Learning method in which students identify their own learning issues from an unfamiliar problem, then research and construct knowledge largely independently (Barrows, 1986; Srinivasan et al., 2007).

Dimension	Case-Based Learning (CBL)	Problem-Based Learning (PBL)
Type of inquiry	Guided inquiry: the facilitator steers discussion toward pre-defined learning outcomes (Srinivasan et al., 2007).	Open inquiry: students generate their own learning issues and may pursue tangents beyond the planned outcomes (Barrows, 1986; Srinivasan et al., 2007).
Information provision	Case information (history, exam, investigations) is substantially provided by faculty, often in stages, alongside predefined questions (Kim et al., 2006; Daher et al., 2017).	Problem is typically brief and unstructured; students decide what information they need and how to obtain it (Srinivasan et al., 2007; Daher et al., 2017).
Student autonomy	Lower: questions and direction are largely predetermined by the case author (Daher et al., 2017).	Higher: students set their own learning outcomes and pace their own research (Barrows, 1986).
Facilitator role	Content-expert facilitator actively steers discussion toward specific learning outcomes (Donkin et al., 2023).	Tutor acts as a process facilitator, deliberately minimising content input to preserve student-directed inquiry (Barrows, 1986).
Theoretical basis	Constructivist and guided-inquiry learning; scaffolds application of already-introduced knowledge (Thistlethwaite et al., 2012).	Constructivist and self-directed learning theory; knowledge is constructed through independent investigation of an ill-structured problem (Barrows, 1986).
Typical case format	Can be brief or extensive; often includes real patient detail and a defined set of guiding questions (Kim et al., 2006; Daher et al., 2017).	Often a short, deliberately ambiguous trigger designed to provoke multiple learning issues (Srinivasan et al., 2007; Daher et al., 2017).
Curriculum resource demands	Comparatively efficient: can cover a defined curriculum in less time, since content is pre-specified (Srinivasan et al., 2007).	More resource- and time-intensive: covering the same curricular content typically takes longer under open inquiry (Wilkes & Srinivasan, 2017).
Empirical comparison	In Srinivasan et al.'s (2007) two-institution study, both students and faculty rated CBL more favourably than PBL on structure, efficiency, and satisfaction.	The same study found PBL was valued for fostering independent inquiry, but was more variable in quality and harder for faculty to facilitate consistently (Srinivasan et al., 2007).
Combined evidence	A 2026 systematic review and meta-analysis found that combining CBL with PBL significantly outperformed lecture-based learning on knowledge, skills, and clinical thinking, suggesting the two are complementary rather than competing (Lu et al., 2026).	(Same source) — PBL contributes the open-inquiry, self-directed learning component within combined CBL-PBL curricula (Lu et al., 2026).

4. Theoretical and Pedagogical Grounding

Both methods sit within a broadly constructivist tradition, but they scaffold learning differently. Barrows' (1986) taxonomy is the foundational reference for understanding PBL as a spectrum rather than a single fixed method: at one end, "lecture-based cases" are entirely teacher-directed; further along, "case method" and "modified case-based"

approaches introduce increasing student direction; and at the far end lies fully self-directed, open-inquiry PBL. CBL, as commonly implemented in medical curricula, typically sits closer to the guided end of this continuum, since the facilitator actively directs discussion toward specific, pre-defined learning outcomes rather than allowing students to define their own (Srinivasan et al., 2007).

This distinction has practical consequences: because PBL relies on students generating and pursuing their own learning issues, its quality is more variable and more dependent on tutor skill and student self-direction than CBL, where the pre-specified structure provides more consistency across groups and facilitators (Barrows, 1986; Srinivasan et al., 2007).

5. Evidence Comparing the Two Methods

Srinivasan et al. (2007) remains the key empirical reference directly comparing PBL and CBL. Following a curricular shift from PBL to CBL at two US medical schools, the authors surveyed faculty and students and found that both groups rated CBL more favourably than PBL on structure, efficiency of learning, and overall satisfaction, while PBL was valued for the independent inquiry skills it fostered, but was reported as more variable in quality and more challenging to facilitate consistently (Srinivasan et al., 2007).

More recent evidence suggests the two methods may be best understood as complementary rather than competing. A 2026 systematic review and meta-analysis of combined CBL-PBL teaching in clinical medical education found that the combined approach significantly outperformed lecture-based learning across theoretical knowledge, practical skills, clinical thinking, and learner satisfaction (Lu et al., 2026). This is consistent with the broader BEME evidence base for CBL, which found generally positive learner and staff perceptions, while noting that outcome measures across the literature are often limited to satisfaction and self-report rather than robust measures of clinical performance (Thistlethwaite et al., 2012).

On motivational outcomes specifically, a large-scale meta-analysis comparing problem-based, project-based, and case-based learning against teacher-centred instruction found small-to-moderate positive effects on student motivation across all three student-centred methods, with no significant difference in motivational impact between PBL and CBL themselves (Wijnia et al., 2024). This suggests that, at least for motivation, the choice between PBL and CBL may matter less than the shift away from purely didactic teaching.

A study specifically examining academic staff's ability to distinguish CBL from PBL found that confusion between the two is common even among experienced medical educators, reinforcing the case for precise, consistent terminology in curriculum documentation (Daher et al., 2017).

6. Implications for Undergraduate Curriculum Design

For colleagues designing undergraduate teaching, the distinction has direct implications for curriculum planning:

- Use CBL where curricular time is limited and content coverage must be predictable: its guided-inquiry structure allows a defined set of learning outcomes to be reliably achieved within a session (Srinivasan et al., 2007).
- Use PBL where the primary goal is developing self-directed learning and independent inquiry skills, and where the additional time and facilitator training this requires can be accommodated (Barrows, 1986; Wilkes & Srinivasan, 2017).
- Consider combining the two: recent meta-analytic evidence supports integrated CBL-PBL curricula as more effective than either lecture-based teaching alone, suggesting the methods can be sequenced or blended rather than treated as mutually exclusive choices (Lu et al., 2026).

- Invest in facilitator training regardless of method chosen, since facilitator skill is repeatedly identified as a key determinant of quality for both CBL and PBL (Barrows, 1986; Donkin et al., 2023).
- Be explicit with students and staff about which method is in use and why: even experienced academic staff have been shown to struggle to reliably differentiate CBL from PBL, underlining the risk of conflating the terms in practice (Daher et al., 2017).

7. Conclusion

CBL and PBL share a family resemblance as small-group, case-anchored, learner-centred teaching/learning methods, but they occupy different points on the guided-to-open inquiry spectrum described by Barrows (1986). CBL offers more structure, more predictable content coverage, and generally higher learner and faculty satisfaction; PBL offers greater student autonomy and stronger development of independent inquiry skills, at the cost of more variable quality and greater resource demands. Rather than treating the two as interchangeable, curriculum designers are best served by choosing deliberately between them, or combining them, according to the specific learning outcomes sought.

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