

REVIEW ARTICLE

Case-based learning (CBL) in undergraduate health professions education: A realist review

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Abstract

Introduction: Case-based learning (CBL) has been adopted internationally, although there is significant heterogeneity in implementation and delivery. It is unclear how this pedagogical approach is experienced across contexts, among different groups of students, and the important aspects of implementation. The aim of this study was to understand the mechanisms that enable CBL to facilitate learning in undergraduate health professions education, for whom and in what contexts.

Methods: A realist review was adopted to explore the literature on CBL. Initial programme theories were derived from the CBL literature and based on adult learning theory and inquiry-based learning. 5731 abstracts investigating CBL in undergraduate HPE courses were screened in duplicate. 436 full-text papers were screened and assessed for rigour and relevance, resulting in 25 papers suitable for inclusion in the final analysis.

Results: Seven programme theories were developed from our review. Institutional, implementation and student-level factors were found to impact outcomes such as exam performance, participation and clinical reasoning. A lack of institutional support and recognition of faculty contribution to CBL results in poorer learning outcomes. Clinical facilitators promote student engagement, and authentic multimodal cases afford students the opportunity to step into their future roles. When assessment focuses solely on behaviours and teamwork is not fostered, negative group dynamics may result.

Discussion: Our realist review provides insight for healthcare educators on how best to implement CBL to optimise academic, skill and behavioural outcomes for undergraduate students. Fostering student trust in learning through access to clinician facilitators and authentic cases leads to improved learning outcomes. Recognition of faculty and student efforts to contribute to CBL is essential for successful implementation. The facilitation of a safe and secure group learning environment is required for students to meaningfully engage with CBL.

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1 | INTRODUCTION

Case-based learning (CBL) is an increasingly popular pedagogy in health professions education.¹ CBL has been defined as a 'learning and teaching approach that aims to prepare students for clinical practice, through the use of authentic clinical cases'.² Following a constructivist, inquiry-based framework, CBL involves facilitated group discussion and navigation of a clinical case³ although the structure can vary between institutions, countries and curricula. CBL has been adopted and integrated in a wide range of educational fields, from medical education to engineering,⁴ at both undergraduate and post-graduate levels.⁵ Reasons for implementation include the ability to bridge foundational sciences with practical application of knowledge, facilitation of deep learning and reflective practices and emphasis on active collaboration.^{1,5,6}

While CBL is an example of small group learning,⁷ it differs from other methods under the same umbrella, such as problem-based learning (PBL)⁵ and team-based learning (TBL).⁸ In PBL, students are presented with a problem (usually a clinical scenario) which requires students to identify their own learning outcomes with minimally directed group discussion.⁹ While CBL also involves the application of peer learning to clinical problems, the student discussions are guided by the facilitator, who directs the discussion according to predetermined learning objectives.^{8,9} TBL also involves a facilitated and guided group discussion; however, it is distinguished from CBL by the four phase structure: preparation, readiness assurance testing, feedback and problem-solving exercises.¹⁰ A 2012 systematic review reported that students considered CBL to be an enjoyable and collaborative learning process which promoted understanding, and facilitators perceived CBL as increasing student engagement.² Three recent meta-analyses all reported that CBL is an effective teaching method that improves student academic performance.^{6,11,12}

It has been argued that the evidence underpinning the outcomes of CBL remains uncertain due to a lack of clarity as to how it facilitates learning.² A 2023 systematic review found significant heterogeneity in CBL implementation, limiting interpretation and implementation of best practice.⁶ Differences in implementation include duration and number of sessions allocated to each case,^{2,13} in-person or online delivery,¹¹ group size,² year of study⁶ and modality of the case (e.g. paper cases, web-based cases or mixed formats).⁵ The variability of these factors has limited the generalisability and applicability of findings.¹¹ Many CBL studies have primarily focused on student perceptions of CBL,¹⁴ which is not the focus of this review. The literature is unclear with respect to the importance of authenticity of cases and the need for clinician facilitators.¹⁵ Numerous hurdles to successful implementation of CBL have been described in the literature including practical resources,^{16,17} time involved,^{2,18} training of facilitators,¹⁹ cultural factors,²⁰ organisational attitudes⁹ and case design.²¹

Given the heterogeneity of implementation, the ambiguity of the evidence and the range of potential barriers to implementation, we chose to undertake a realist review of the CBL literature to

determine the underlying contexts and mechanisms to successful implementation. We set out to understand the mechanisms that enable CBL to facilitate learning in HPE, for whom and in what contexts.

2 | METHODS

2.1 | Study design

We adopted a realist approach for this literature review as it is particularly suited to examining complex interventions and the interactions between the contexts in which they are conducted, their underlying mechanisms and resultant outcomes.²² Realist methods are theory driven and seek to understand *how* a programme facilitates learning rather than *if* it does. Through the application of learning theory, realist methods can explore the process of learning and contribution to outcomes.²³ Realist methods involve the coding of contexts, mechanisms and outcomes. Context (C) in realism refers to the conditions of implementation which are relevant to the operation of the programme.^{23,24} Mechanism (M) refers to underlying determinants of social behaviour which bring about effects,²⁴ including both the resources provided by an intervention and the choices, perceptions or reasoning responding to those resources.²⁵⁻²⁷ These mechanisms, in specific contexts, trigger consequences and effects (intended or unintended), described as outcomes (O).²⁸ The heuristic of this reasoning process can be described as a context-mechanism-outcome (CMO) configuration.^{29,30} The creation of if-then statements allows a testing of logic to further develop theory regarding how a programme functions. This type of methodological approach is ideal for the investigation of the multitude of factors which impact on the delivery and outcomes of a CBL curriculum.

Pawson's five stages of a realist review were conducted for this research: (1) clarifying scope, (2) searching for evidence, (3) evidence appraisal, (4) data extraction and (5) data synthesis.³¹ The RAMESES II reporting guidelines for realist synthesis were followed.³²

2.2 | Review scope

Our research team conducted a preliminary review of the literature exploring CBL in undergraduate health professions education. The seminal CBL texts describe adult learning theory (ALT) and inquiry-based learning (IBLT) as the learning theories assumed to underpin CBL,² so were selected to inform our initial programme theories. ALT proposes that learning in CBL is created by social and active engagement with clinical cases and incorporates elements such as motivation, meaningfulness and linking of knowledge to practice.³³ IBLT outlines a constructivist, structured approach to learning, involving application of knowledge to authentic tasks.³⁴ We iteratively discussed and developed these theories to create our initial programme theories.

2.2.1 | ALT and CBL

- CBL in undergraduate health professions education (C) affords students the opportunity to apply their learning to authentic clinical scenarios in a social learning environment (C). This facilitates active (M), meaningful (M) engagement with their learning, increasing motivation (M) and allowing learners to see the relevance (M) and significance (M) of their learning to future clinical practice. Through this, CBL leads to improved student knowledge, skills and behaviours (O).

2.2.2 | IBLT and CBL

- CBL in undergraduate health professions education (C) creates a constructivist and co-operative learning environment (C) where students learn through a structured and guided approach to realistic clinical cases: navigating cases with guidance and support (M) fosters collaborative (M), deep learning (M), creating a relationship between theory and practice (M) through the contextualising of abstract knowledge (M). Through these means, CBL achieves improved knowledge, skills and behaviours (O).

The wide variety of implementation approaches for CBL found during the preliminary literature review necessitated the development of a tighter definition of CBL. We defined CBL for the purposes of this review as an inquiry-based guided group discussion³ involving the application of student knowledge to a clinical case with clear learning outcomes² in a non-clinical environment. The requirement for group discussion being guided in our definition distinguished CBL from the similar PBL, in which no guidance for discussion is found and learning outcomes are not pre-determined.⁶ This guidance was considered to include the scaffolding and prompting of discussions aligned to set learning outcomes. Clinical cases for the purposes of the study were defined as an idealised, formalised or naturalistic patient-centred representation of a real practice setting used as a practicum.³⁵ Authenticity is conceptualised as cases correlating to the expected professional activities of the real world, engaging students with the conventions of their future profession, connecting student learning with new experiences and students perceiving cases to be reflective of reality.^{36,37} Our outcomes of interest related to student learning in the three domains of knowledge, skills and behaviours.³⁸ Knowledge outcomes were regarded as those which related to the acquisition of concepts or principles and skills outcomes pertained to the acquisition of psychomotor, social or clinical reasoning skills.³⁹ Behavioural outcomes were defined for our review as relating to indicators of professionalism, specifically student participation, teamwork and empathic engagement during CBL.

2.3 | Searching for evidence

We undertook a formal search in May 2024 in CINAHL, PsycINFO, ERIC, PubMed, EMBASE and Web of Science. Search terms included 'case-based learning' OR 'small group learning' OR 'case-based

teaching' AND 'medical students' OR 'nursing students' OR 'pharmacy students'. The search was exported to Endnote 21⁴⁰ and uploaded to Covidence⁴¹ with duplicates removed. Only primary studies focusing on compulsory CBL in undergraduate health professions education were included. For the purposes of this review, undergraduate health professions education was defined as including both direct and graduate entry HPE programmes but excluding postgraduate courses and degrees. Given the large number of reaction-focused Kirkpatrick level 1 studies in the CBL literature,² we excluded studies not reporting on objective or measurable learning outcomes. Outcomes were categorised as knowledge outcomes where learning acquisition was assessed through written examinations, multiple-choice examinations and oral or written assignments. Skills outcomes included assessment of acquisition of skills through objective structured clinical examinations or observational grading by faculty. Behavioural outcomes included outcomes pertaining to engagement, participation, empathy or teamwork as assessed by faculty or other objective measures (e.g. attendance or completion of tasks). The full search strategy is included in Appendix S1.

2.4 | Evidence appraisal

Two authors (RD and ET) screened abstracts for inclusion and studies underwent full-text screening for relevance to the programme theories and rigour. The criteria used to assess relevance and rigour are included in Appendix S1. Studies were assessed for relevance according to their ability to contribute to the development of programme theories, with studies that addressed any aspects of the initial programme theory considered of high relevance. The assessment of rigour of the studies,⁴² involved consideration of aspects such as bias, trustworthiness and validity. Studies deemed to have minimal or no relevance to the programme theories or poor rigour were excluded.

Full-text appraisal was independently performed in duplicate by researchers RD and ET, and decisions were adjudicated by the other research team members. The search strategy was repeated in July 2025 to ensure inclusion of more recently published articles.

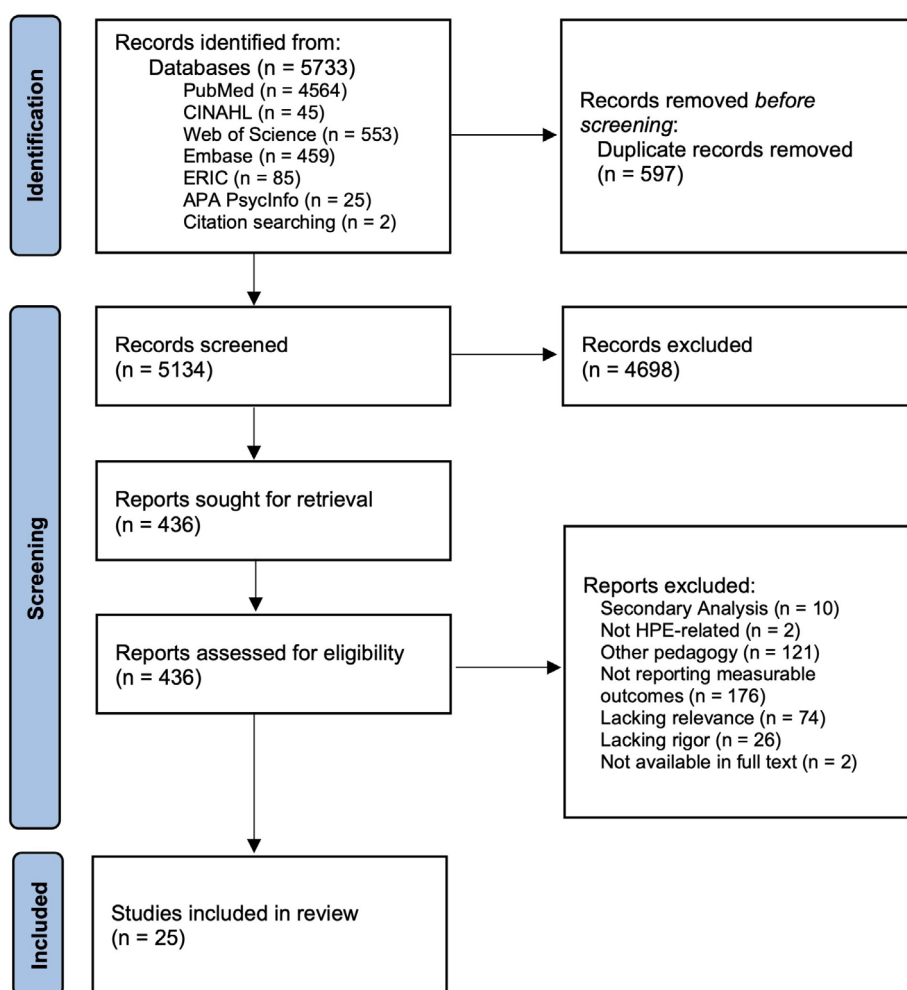
2.5 | Data extraction and synthesis

Study characteristics and contexts, mechanisms and outcomes (CMOs) were identified and extracted into a Microsoft Excel spreadsheet. Common contextual factors and outcome patterns in the data were grouped together and iteratively examined to develop CMO configurations. These CMO configurations were then tested more broadly across the data and discussed by the research team in order to develop the final programme theories.

3 | RESULTS

The initial search yielded 5137 results. 4651 abstracts were screened following removal of duplicates. 424 full-text articles were reviewed,

FIGURE 1 Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) diagram. [Color figure can be viewed at wileyonlinelibrary.com]



and 24 studies were included for analysis. The repeat search found an additional 594 results, and abstract screening was conducted for 483 studies. An additional 12 studies underwent full-text review, and one paper was added to the analysis (n = 25). This process is summarised in our Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) diagram (Figure 1). Seventeen quantitative studies were represented in the sample, with four qualitative and five mixed method studies included. All studies included were of medium to high rigour and relevance (n = 25).

3.1 | Description of studies

CBL intervention studies were conducted in the United States (n = 10), Australia (n = 3), the United Kingdom (n = 3), Europe (n = 3), Saudi Arabia (n = 1), UAE (n = 1), Indonesia (n = 1), China (n = 1), South Korea (n = 1) and Canada (n = 1). Interventions were typically conducted in medical programmes (n = 19), with nursing (n = 3), dentistry (n = 1) and interprofessional programmes also represented. CBL was primarily conducted in-person (n = 24) and involved students in the early years of their education (year 1–3, n = 21). Group size ranged from four students to 24, with most involving groups of 12 or fewer (n = 15). CBL was facilitated by academic

faculty in all included studies (n = 25). Clinicians (n = 6), non-clinicians (n = 4) or a combination of both (n = 3) acted as facilitators (Appendix S2). Twelve studies did not describe an underpinning educational learning theory.^{43–53} Eight interventions referenced learning theories as informing their interventions, with IBLT^{43,54–58} and ALT^{16,59,60} described. Five studies made mention of adult learners^{61,62} or the concept of inquiry^{8,61,63,64} but did not explicitly refer to these theories. Study outcomes were aligned to the learning domains of knowledge,^{16,43,45–47,49,50,52,54,58–65} skills^{48,53} and behaviours^{8,16,44–46,48,51,55–59,65} outlined in the initial programme theories. Eight studies reported on outcomes in more than one domain (n = 6). Outcomes resulting from the CBL interventions included clinical reasoning, engagement, acquisition of knowledge, communication and collaboration between students. Outcomes are collated and summarised in Appendix S2.

3.2 | Programme theories

Seven programme theories were developed. Evidence for each theory is provided by reference to the included studies and summarised in Appendix S2. Individual study evidence for each programme theory is included in Tables 1–8.

TABLE 1 Programme theory 1 with supporting evidence.

When CBL is implemented by an institution with investment in faculty time, training and recognition of their contribution (C), faculty will feel motivated to participate in CBL (M). This institutional support (M) fosters positive faculty engagement with CBL (M) leading to improved knowledge outcomes and engagement (O)			
Author (year)	Quotation(s) Outcome(s)		
Abbott (2010) ⁴³	‘There is a continuing need for critical review and revision of SPP cases, and an ongoing requirement for the curriculum office to maintain an active role in assuring the viability and utility of the project’ Improvement in knowledge as assessed by US Medical Licensing Examination (USMLE) scores following the introduction of CBL curriculum		
Cendan (2011) ⁵⁹	‘The department Chair provided the guarantee that faculty would be consistently available for this endeavor. Our department has approximately 40 faculty members who would be able to cover all of these topics comfortably; thus, each faculty member can anticipate leading a small group block at least once per year. This allowed us to have the “power” to engage faculty and address issue number 2—educational refocusing’	‘Generally speaking, there has to be some benefit to participating in this venture which, at onset, appeared onerous to many. The necessary enticement came in the form of recent tenure and promotion changes at our institution’	‘From the faculty standpoint there is no question that the small group model requires more time for deployment and preparation and that this time is primarily coming from clinical and administrative time. This is an issue which will challenge the widespread adoption of the small group model. We were fortunate to have institutional and departmental support in this endeavor and would encourage any clerkship director planning to make the change to consider the positive benefits strongly. Anecdotally, these include greater faculty enjoyment with the small group structure, and greater opportunity to interact with the students for guidance, career advice, and requests for letters of recommendation for future residency applications’
	CBL intervention demonstrated an increase in percentile on National Board of Medical Examiners (NBME) results compared to lectures. Increased student time spent preparing for CBL sessions over lectures		
Christianson (2007) ⁶¹	‘Finally, we instituted an educator–scholar track for faculty promotion, to recognize the importance of teaching and to provide a path for those who concentrate their efforts in this activity’ Improved USMLE scores both internally and against the national average		
Nordquist (2012) ¹⁶	‘You know, it was a matter of prioritization. Why should I sacrifice 2 days for CBL faculty development? I don't have time for that; I've got other things to do. “I can manage this”, I thought, and then I found out that I didn't, but that's the way it happened’ — Facilitator	‘The preparation time for teaching with cases was not properly recognized by the hospital management. Thus, the preparation had to be undertaken outside scheduled work hours and without pay’	‘A high level of conflict characterized the first semester. There were strong tensions and open conflict among the faculty regarding the new intervention’
	No significant improvement to knowledge over traditional didactic learning. Lack of student engagement with CBL. Facilitators reported a lack of student engagement and open hostility towards the CBL intervention		

3.2.1 | Institutional level

Faculty investment and recognition

When CBL is implemented by an institution with investment in faculty time, training and recognition of their contribution (C), faculty feel motivated to participate (M). This institutional support (M) fosters positive faculty engagement (M) leading to improved student knowledge outcomes and student engagement (O).

Implementation of CBL requires faculty involvement and participation.^{16,43,59,61} Failure of an institution to appropriately invest in and

recognise this contribution creates hostility towards CBL interventions.¹⁶ Institutional support through faculty time and recognition creates enthusiasm, improving learning and engagement through the cultivation of feedback-based student–teacher relationships.⁶¹ When faculty perceive CBL as an under-appreciated and under-resourced burden, a negative attitude towards CBL and poorer student learning results.¹⁶ CBL involvement being considered important for academic career progression and acknowledgement of the time and training required for faculty to facilitate cases leads to receptiveness to CBL implementation.^{59,61}

TABLE 2 Programme theory 2 with supporting evidence.

When students engage in CBL cases facilitated by clinicians (C), the credibility of the clinician facilitator (M) creates trust in the learning achieved (M) and students recognise the relevance of their learning to future practice (M). This results in improved student engagement, communication and clinical reasoning (O)		
Author (year)	Quotation(s) Outcome(s)	
Abbott (2010) ⁴³	— Improvement in knowledge as assessed by USMLE scores following the introduction of CBL curriculum involving clinician facilitators	
Braeckman (2014) ⁵⁴	‘Feedback of experienced physicians is critical for students to find out what level of knowledge and skills they already possess’ CBL facilitated by clinicians and involving an in-person patient improved student performance compared to CBL without a real patient	
Burgess (2021) ⁸	‘Compared to the large classes of TBL, facilitators found the small group size of CBL encouraged interactive learning with students more forthcoming with asking and answering questions. They also reported they could readily role model their clinical reasoning to impart their knowledge’	‘I think I learnt way more I than I do in TBL because it's like very clinically-based, and it's more focused on management and treatment and stuff which we don't get to do really in TBL—it was way practical oriented. Especially because the tutors were all clinicians, so they were always talking about what wouldn't be feasible on the ward—I really enjoyed that’—Student Facilitators reported students in CBL to be encouraging of discussion and participation in the learning process and respectful of differing opinions
Gold (2020) ⁶³	‘Informal analysis of student comments suggests that one of the main drivers of student satisfaction with the TB-CBL method was that all students shared the same experience with a single facilitator. On the other hand, one of the most common criticisms of the traditional CBL method was that the experience and value of the sessions depended heavily on the skill of individual facilitators and what they chose to emphasize in each group. By moving all students to the lecture hall, this variability was eliminated’ No difference in clinical reasoning was seen between non-clinician small-group CBL and large group CBL facilitated by a single facilitator	
Hay (2001) ⁶⁰	‘[...] students with more positive ratings of their tutor (as found for those taught by the non-expert) may have had a more positive overall experience and felt more confident and willing to complete the test’ Students engaging in CBL activity with a clinician had significantly higher examination scores compared with those facilitated by a non-clinical tutor	
Nordquist (2012) ¹⁶	‘... a facilitator must have good knowledge of the area discussed to frame the questions and to capture and contextualize the student's response in the discussion’ No significant improvement to knowledge over traditional didactic learning. Lack of student engagement with CBL	
Park (2020) ⁵⁷	As one student mentioned, ‘I think, particularly those weeks we were learning about kidneys, ... [the tutor's] background was super helpful He pushed the group along with his clinical knowledge’ (S7). By contrast, problems with tutors included ‘inconsistency in terms of the information received from our CBL tutors’ (S9) and an approach in which tutors were ‘really quiet and just sat back and listened’ Students described giving up on the group or relying on the tutor to address the problem where group function was suboptimal. Lack of engagement and buy-in to CBL process	
Sutyak (1998) ⁵²	— Students with a low interest in surgery who underwent an unstructured CBL (case information presented only when specifically sought from clinician facilitator) performed as well as those with a high interest in surgery in clinical reasoning who underwent unstructured or structured CBL (case information presented to students at the outset of the session)	
Yoo (2015) ⁵³	— Significant improvement in communication skills between CBL involving clinicians and didactic group learning	

‘The somewhat negative results can therefore be interpreted as mainly a result of a faulty implementation process, not as a result of poor quality of the CBL learning activity. Most common among both faculty and students during the implementation process seems to be the perceived lack of information, expectations, and time in connection to CBL.’¹⁶

Clinician facilitators

When students engage in CBL cases facilitated by clinicians (C), the credibility of the clinician facilitator (M) creates trust in the learning achieved (M), and students recognise the relevance of their learning to future practice (M). This results in improved student engagement, communication and clinical reasoning (O).

TABLE 3 Programme theory 3 with supporting evidence.

When cases in CBL are authentic and incorporate patient encounters, role-plays or multimedia (C), preclinical students step into their future identities as health professionals (M). When cases align to their curriculum (M), students recognise the relevance of their preclinical learning to their future careers (M). This motivates engagement (M), reflection on knowledge (M) and identification of knowledge gaps (M). Participation in the CBL process, knowledge gains and understanding of patient-centred clinical care will then result (O)			
Author (year)	Quotation(s) Outcome(s)		
Abdel-Wahed (2024) ⁶⁵	‘The active application of critical thinking skills in real-world clinical scenarios cultivates the students’ analytical abilities along with their aptitude to develop and utilize knowledge and cognitive resources relevant to practical situations [25]. Besides critical thinking, the present study showed that RP had a significant positive impact on teamwork skills’ Both teamwork and critical thinking scores showed significant increases following CBL intervention with role-plays		
Al-bedaery (2024) ⁴⁴	‘Participants identified the clinical narrative of CBL as alerting them to the reality of being a doctor in an engaging way (e.g. participant 1). There was recognition that the cases were true to life clinically, and excitement when fiction became reality and health care learning experiences mapped onto CBL cases’	‘An overarching theme which resonated amongst participants was the opportunity the cases gave them to rehearse their future roles as doctors, including thought processes and reactions. The CBL cases sometimes featured role-play with speech, which they appreciated, but in all cases the stories themselves led students to identify with the doctor and then mentalise the experiences of healthcare the doctor was involved in’	‘Patient ethnicity was portrayed in the cases using thick descriptions. However, health professional ethnicity used name as a proxy, as visual and other non-verbal cues that would convey ethnicity are not part of our text-based case delivery system. We realise that there are limitations with this approach. Using multimedia case delivery or complimentary professionalism resources such as online vignettes of health professionals might improve this in the future’ Increased exposure to a diverse patient cohort and increasing understanding of roles within healthcare with authentic narrative CBL
Braeckman (2014) ⁵⁴	‘The most important advantage of real patients’ encounters is authenticity. Contact with patients can help students relate to their identity as future doctors and strengthen their beliefs about why they are in medical education. At this stage of the curriculum, our students have few opportunities to practice intensively with patients and for the majority of them, this was a valuable opportunity to take personally a history and perform a physical examination of a patient’ CBL involving an in-person patient improved student performance compared to CBL without a real patient		
Burgess (2021) ⁸	‘Use of authentic patient cases encourages discussion to emulate the complexities of clinical cognition, with the ability to expose students to complex clinical data and clinical care [4]’	‘I think I learnt way more than I do in TBL because it’s like very clinically-based, and it’s more focused on management and treatment and stuff which we don’t get to do really in TBL—it was way practical oriented. Especially because the tutors were all clinicians, so they were always talking about what wouldn’t be feasible on the ward—I really enjoyed that’ Facilitators reported students in CBL to be encouraging of discussion and participation in the learning process and respectful of differing opinions	‘It is a good culmination of relevant skills that mimic a real life situation, requiring students to apply basic science, clinical reasoning and history and examination skills’
Cendan (2011) ⁵⁹	‘Students’ comments echo earlier research from McMaster University which supports that students see the relevance of the material and its clinical link as an important driver for reading and therefore understanding and academic performance’ CBL group demonstrated an increase in percentile on NBME results compared to lectures. Increased student time spent preparing for CBL sessions over lectures		
Christianson (2007) ⁶¹	‘The case wrap-up at the end of the week, where both patient and physician are present, further reinforces that caring for the patient is the focus of our work. Students value most highly the opportunity to hear from the patient about the illness experience; in fact, they are disappointed if the wrap-up physician does not allow adequate time for the patient’s perspective. A second, powerful message relates to the value given to learning in groups—the sense of team—which provides a model for working within a health care team’ Improved USMLE scores both internally and against the national average		
Kaddoura (2011) ⁶²	‘The cases in CBL help build on prior knowledge, integrate data, and consider application to future situations’ Critical thinking scores were higher in CBL than lecture-based learning based on analysis, evaluation, inference, deduction and induction test component		

TABLE 3 (Continued)

When cases in CBL are authentic and incorporate patient encounters, role-plays or multimedia (C), preclinical students step into their future identities as health professionals (M). When cases align to their curriculum (M), students recognise the relevance of their preclinical learning to their future careers (M). This motivates engagement (M), reflection on knowledge (M) and identification of knowledge gaps (M). Participation in the CBL process, knowledge gains and understanding of patient-centred clinical care will then result (O)	
Author (year)	Quotation(s) Outcome(s)
Lestari (2023) ⁵⁶	‘[...] scenarios play at least three roles in the construction of the learning environment that discussion of the scenarios serves to encourage students to activate relevant prior knowledge, stimulates students' interest and thus their intrinsic motivation to learn, and sets a context for the learning of knowledge similar to that in which future use of the knowledge will be required [39]. If the scenario could not set the context for the learning of knowledge that will be used by nurses in their future work, it means it does not address nursing competency. This situation will make nursing students difficult and less motivated to participate within the discussion process’ Interprofessional CBL activity involving medical, nursing and midwifery students demonstrated collaboration and learning from other professions
Osborne (2021) ⁵¹	‘During the video clips, the students described actively imagining themselves in the role of the doctors portrayed. This appeared to enable them to ‘test’ and identify gaps in their clinical knowledge, and reflect on how they would like to practise’ Improved understanding of holistic care and collaborative work following CBL intervention using clips from medical reality television programmes
Sartania (2022) ⁵⁸	‘Reinforces knowledge from lectures in a practical case situation; we learn more when we discuss the topic with others and it helps consolidate knowledge’ (Students 99 and 49) Increased engagement through participation and small group discussions. Knowledge outcomes significantly improved in topics taught by collaborative CBL compared to traditional CBL
Sutyak (1998) ⁵²	‘As these cases are designed to more approximate clinical reality, students may feel more like “real doctors” as they progress through the scenarios’ Students with a low interest in surgery who underwent an unstructured CBL (case information presented only when specifically sought from facilitator) performed as well as those with a high interest in surgery in clinical reasoning who underwent unstructured or structured CBL (case information presented to students at the outset of the session)
Yoo (2015) ⁵³	‘Furthermore, tangible and realistic cases that were used in this study were relevant to the clinical environment, thereby improving participants' motivation to learn’ A significant increase in the communication skills score of students following CBL intervention compared to lecture-based learning was observed, with a significant difference in the communication skills of the two groups

Six of the 25 studies reported using clinicians as facilitators for CBL^{8,43,52–54,62} with an additional four studies using both clinician and non-clinician facilitators.^{51,57,60,61} The use of facilitators with clinical experience was associated with improved knowledge,^{43,54,60} clinical reasoning,^{8,62} communication skills⁵³ and engagement.⁸ Facilitation without clinicians was associated with poorer outcomes in both knowledge and behavioural domains.^{45–47,63} A statistically significant difference in examination performance was found by randomised control trial in students participating in CBL facilitated by a clinician compared to non-clinicians.⁶⁰ One study demonstrated improved student learning from CBL using non-clinician facilitators over self-directed case study; however, this intervention included dedicated facilitator training and regular meetings to clarify learning objectives and expectations.⁴⁷ Clinician facilitators can role-model their own clinical experience for students in CBL, leading to improved clinical reasoning.⁸ Clinical experience gave facilitators credibility, building trust that knowledge students gained from CBL would be sufficiently complete for both their current learning and future practice.

“[...] students with more positive ratings of their tutor (as found for those taught by the non-expert) may have had a more positive overall experience and felt more confident and willing to complete the test.”⁶⁰

3.2.2 | Implementation level

Authenticity

When CBL cases are authentic and incorporate patient encounters, role-plays or multimedia (C), preclinical students step into their future identities as health professionals (M). When cases align to their curriculum (M), students recognise the relevance of their preclinical learning to their future careers (M). This motivates engagement (M), reflection on knowledge (M) and identification of knowledge gaps (M). Participation in the CBL process, knowledge gains and understanding of patient-centred clinical care will then result (O).

TABLE 4 Programme theory 4 with supporting evidence.

When CBL assessments focus on evaluation of behaviour (C), students prioritise participation over collaborative learning (M). Students seek to positively influence this subjective assessment (M), at the cost of group dynamics and knowledge acquisition (M). This results in a lack of correlation between student engagement in CBL and knowledge gained (O)	
Author (year)	Quotation(s) Outcome(s)
Carrasco (2018) ⁴⁶	'In addition, because ALG scores are subjective, faculty facilitators may feel pressure to refrain from assigning poor scores to a student as ALG groups, including faculty facilitators, remain the same for an entire academic year and a low score given by a facilitator in a weekly student ALG evaluation could create future personal problems between the student and the facilitator. Some facilitators may even fear retaliation for poor ALG scores in the form of poor student evaluations of the professor' Stronger correlation between final exam scores and knowledge-based TBL weekly assessments than performance-based CBL assessments
Carrasco (2021) ⁴⁵	'Notably, ALG groups offer a non-judgmental venue where students engage in deep discussion of numerous biopsychosocial subjects during the academic year, which may not be discussed in other settings in our pre-clinical curriculum. Students also use this opportunity to share what they have learned in their own clinical experiences and to observe the behaviors of their preceptors, which they may want to emulate later in their careers. Finally, ALG-associated dialogue supports student development of diagnostic skills and empathy for patients while refining their professionalism skills. This will ultimately help them to provide better patient care by allowing them to connect with their patients and advocate on their behalf' TBL scores correlated more strongly to final exam scores, participation in CBL ($p < 0.05$). Subjective preparation score for CBL did not consistently correlate to final exam scores
Park (2020) ⁵⁷	'As another student noted regarding the spectre of evaluation, "there's this kind of unspoken rule that as long as you don't get flagged, you're fine" (S5). In short, it was considered better to passively allow the dysfunction of others to continue than to raise alarms and risk receiving poor marks or evaluations by trying (and possibly failing) to address it' 'The discussions that the students engage in during SGL activities, therefore, might be interpreted as primarily a performative act to impress the tutor to receive a favorable grade on their assessment' Students allowed group dysfunction to continue rather than to raise alarms and risk a poor evaluation by addressing it, resulting in a lack of engagement and buy-in to CBL process

Eleven studies demonstrated that authentic cases linked students' theoretical knowledge to clinical practice, leading to improved learning outcomes.^{8,44,51–54,56,58,59,61,62,65} In-person patients,^{54,61} simulated patients,⁵³ video footage from medical reality television programmes⁵¹ and role-play⁶⁵ were incorporated into CBL to create a realistic representation of clinical scenarios, leading to active participation and prompting reflection on knowledge gaps. Through creating opportunities for students to role-model themselves as healthcare professionals, authentic cases were found to motivate engagement and knowledge acquisition.^{8,44,51–54,62,65} This authenticity improved understanding of roles within the healthcare system in early-stage students who have yet to begin clinical placements and provided exposure to a more diverse patient cohort.⁴⁴

*"Participants identified the clinical narrative of CBL as alerting them to the reality of being a doctor in an engaging way (e.g. participant 1). There was recognition that the cases were true to life clinically, and excitement when fiction became reality and health care learning experiences mapped onto CBL cases."*⁴⁴

Assessment

When CBL assessments focus on evaluation of behaviour (C), students prioritise participation over collaborative learning (M).

Students seek to influence assessment (M) at the cost of group dynamics and knowledge acquisition (M). This results in reduced knowledge gained (O).

The subjective assessment of student behaviour in CBL by their facilitator was associated with group dysfunction.⁵⁷ Where grades were reliant on the evaluation of participation and engagement, students prioritised seeking a positive grade over successful group learning.⁵⁷ This prioritisation affected how participation in CBL interventions translated to knowledge acquired from the intervention. Scores on subjective assessment of student behavioural outcomes from CBL such as preparation and participation were not found to correlate to student performance on assessment of knowledge.^{45,46} Students in such interventions tolerate group dysfunction to avoid disruption which could negatively affect the subjective assessment of their behaviour.^{46,57} Facilitator reluctance to award low grades due to fear of retaliation or awkwardness during CBL further drives this lack of correlation.^{46,57}

*"As another student noted regarding the spectre of evaluation, 'there's this kind of unspoken rule that as long as you don't get flagged, you're fine' (S5). In short, it was considered better to passively allow the dysfunction of others to continue than to raise alarms and risk receiving poor marks or evaluations by trying (and possibly failing) to address it."*⁵⁷

TABLE 5 Programme theory 5 with supporting evidence.

When students engage with preparation resources in CBL (C), students gain confidence in their knowledge required to participate in group discussions (M). Incentivising student preparation (M) motivates students to engage with these materials and subsequent discussions (M), improving engagement, participation and knowledge (O).		
Author (year)	Quotation(s) Outcome(s)	
Abdel-Wahed (2024) ⁶⁵	‘Furthermore, students highlighted the need for advance notice about the teaching approach, especially when diverse session types are planned. Early information would enable them to adequately prepare and engage more effectively in the scenarios, ensuring thorough exploration of key topic areas’ Both teamwork and critical thinking scores showed significant increases following CBL intervention with preparation materials and role-plays	
Burgess (2021) ⁸	‘Students commented that the CBL session would benefit from assigned pre-reading preparation, as occurs with TBL’ Facilitators reported students in CBL to be encouraging of discussion and participation in the learning process and respectful of differing opinions	
Carrasco (2018) ⁴⁶	‘Increased preparation for ALG will improve the quantity and quality of participation as suggested by our study data where students who perform better on tests of medical knowledge participate more in active learning settings. Improved participation will also facilitate better peer-to-peer teaching in this active learning setting’ Stronger correlation between final exam scores and knowledge-based TBL weekly assessments than performance-based CBL assessments	
Cendan (2011) ⁵⁹	— CBL group demonstrated an increase in percentile on NBME results compared to lectures. Increased student time spent preparing for CBL sessions over lectures	
Fortun (2017) ⁴⁷	‘In this regard, some students felt less comfortable than others going into a discussion without knowing the disease or general topic of the CBL, and they would have preferred to have the cases or topics available ahead of time to prepare for the discussion’ Higher performance on essay questions in CBL group compared to no CBL, less variability and demonstrating integration of knowledge. No difference between non-CBL and CBL for MCQ results or retention of knowledge	
Lu (2024) ⁶⁴	‘The flipped classroom in our study shifted the decision-making power of the classroom to the hands of the students, who become the protagonists of independent inquiry. The classroom time was redistributed, and the teaching content was transferred to outside of the classroom. At the same time, the communication and discussion that occurred in the classroom could better establish the knowledge framework (Wong et al., 2023), helping students to better internalise the required physiology knowledge’ Improved knowledge outcomes with flipped classroom CBL than those in a traditional lecture-based group	
Nordquist (2012) ¹⁶	‘Another problem was the poor level of preparation among the students, which had a negative impact on the quality of the interactive discussions’	‘It was unclear how to prepare properly for a case seminar, and it became quite intimidating because they did not understand what was expected of them in class’ ‘It is during this individual reflective process that the student’s personal previous experiences and knowledge integrates with new knowledge from the specific case. Individual learning is stimulated. In the second phase, the seminar, the case can initially be discussed in small groups of students. Here the students have the opportunity to take part in the reflections of others and test their own ideas and views. Peer learning is promoted in this way’ No significant improvement to knowledge over traditional didactic learning with CBL. Lack of student engagement with CBL. Group discussion and engagement was found by expert facilitators to be challenging and required facilitator intervention
Yoo (2015) ⁵³	‘Self-directed, individual problem-solving prior to group discussion stimulates individuals’ interest, curiosity, and intrinsic attention, thus encouraging active participation and improving self-efficacy (Keller, 1987; Jonassen & Hernandez Serrano, 2002; Williams, 2005; Yoo et al, 2010) and, consequently, learning motivation’ A significant increase in the communication skills score of students following CBL intervention compared to lecture-based learning was observed, with a significant difference in the communication skills of the two groups	

TABLE 6 Programme theory 6 with supporting evidence.

When students engage in CBL without teamwork supports (C), a lack of trust in others' contribution creates an individualistic approach to learning (M). Changing groups regularly (M) allows students to avoid addressing group dysfunction (M). Without effective facilitation or preparation for group work (M), students withdraw from participation in CBL (M), resulting in an unsafe learning environment (O), poor collaboration (O) and poor engagement (O).			
Author (year)	Quotation(s) Outcome(s)		
Abdel-Wahed (2024) ⁶⁵	'To address these issues, we conducted a calibration/training workshop for the instructors prior to the sessions. During this workshop, strategies for observing group dynamics were discussed, ensuring that no single student dominated the discussion while others were left out. Assuring a safe, non-judgmental and humorous environment helped relief reluctance and anxiety of the students' Improved teamwork and critical thinking with CBL intervention incorporating role-plays with facilitator training on management of group dynamics		
Kochis (2021) ⁴⁸	'I think it was very hard for me at the table at first because often one member would jump into answering the question immediately and respond with the answer as opposed to the process. This was frustrating, as we often skipped the thought process and thus important misconceptions [...]' 'This study presents data that would challenge this notion: within peer groups, there were a significant number of individuals who perceived the learning environment as psychologically unsafe [20]. A number of features including dissimilarities in personality types, different prior experiences and expertise, unconscious bias, and diverging goals for the class may all result in different status assessments among peers [25, 26]. The literature on psychological safety in medical school contexts primarily relates to mistreatment and the implications of its absence [27]. This project indicates that a relatively low-key norming intervention can promote psychological safety among peers and may be an important curricular element to consider for anyone relying on group work without peer assessment or formal feedback on group performance' Teamwork skills improved through norming session through increased psychological safety and accountability compared to historical control data	'... once students reached a certain threshold of psychological safety fueled by balanced participation, ensuring understanding, and active synthesis, teams worked together happily in many different ways'	'I also felt hesitant to speak up because the pattern had been to jump directly to the answer, which is not how I am able to think. It was exhausting trying to counteract this every day, especially at the end of the day. I felt like there was no effort to try and reign their responses in. Sometimes, it felt like there was no room for wrong answers as well, because some group members discounted someone else's response. I noticed that the other female member of the group became quieter over time as well. It did not feel like a collaborative effort'
Krupat (2016) ⁴⁹	'However, the differences between CBCL and TBL raise some important questions that suggest the need for a deeper exploration as to "what is readiness?" and "readiness for what?" CBCL aims to ensure that students are ready to discuss case-based material in class by requiring them to submit answers to a set of challenging MCQs prior to class; this also serves the purpose of focusing their preparation' Final exam scores not different between PBL and CBL. Collaborative CBL students who previously performed below the median scored higher than similar students in PBL		
Nordquist (2012) ¹⁶	'Peer information from the first cohort also suggested that the method was a waste of time and energy, which caused one student to try to change rotation to another hospital to avoid being subject to this particularly learning activity during the surgical rotation' No significant improvement to knowledge over traditional didactic learning. Lack of student engagement with CBL. Group discussion and engagement was found by expert facilitators to be challenging and required facilitator intervention		
Park (2020) ⁵⁷	'However, the students felt that they could not rely on the group to help their learning and thus did not leverage the various backgrounds of the group members. As a result, most students felt that their experiences with the group were not about deepening, expanding, or challenging their understanding of the content-based learning objectives for the session. Rather, they described the group sessions as what one participant termed "a double check" (S8)'	'In describing their reasoning for not pressing their efforts, students also suggested that their CBL groups were only together for a short period, and therefore, it would not be worth the effort to fix group function issues. This attitude was reflected by one student who said: "So, in 6 weeks if you don't like your group, I mean, you can kind of just suck it up and it's done"'	'That's where I'm at with CBL ... I'm just going to grin and bear it, and I'm just going to play the game, and I'm going to find other ways to learn (S4)' 'First, students did not seem to perceive that their formalized SGL sessions enhanced their deep learning of content through collective discovery learning, co-construction of knowledge, and productive challenging of each other's different perspectives on the material. Rather, their SGL experiences seemed to reinforce their need to identify and learn the material on their own,

TABLE 6 (Continued)

When students engage in CBL without teamwork supports (C), a lack of trust in others' contribution creates an individualistic approach to learning (M). Changing groups regularly (M) allows students to avoid addressing group dysfunction (M). Without effective facilitation or preparation for group work (M), students withdraw from participation in CBL (M), resulting in an unsafe learning environment (O), poor collaboration (O) and poor engagement (O).			
Author (year)	Quotation(s) Outcome(s)		
	Students gave up on the group or relied on the tutor to address the problem where group function was suboptimal. Group dysfunction was allowed to continue rather than to raise alarms and risk a poor evaluation by addressing issues, resulting in a lack of engagement and buy-in to CBL process		
Sartania (2022) ⁵⁸	'Encouraged students to identify own learning needs; onus is on students to breakout and discuss' (Tutor 36)	'... some of the students felt uneasy about being expected to discuss complex scenarios in such small groups, apparently not confident that they had the knowledge to do so'	with the SGL sessions functioning more as a check of their knowledge than a mechanism of active, collaborative learning' 'Tutors also noted that cCBL helped students identify their own learning needs as the small group discussions readily identified knowledge gaps' Increased engagement through participation and small group discussions following introduction of collaborative CBL. Knowledge outcomes significantly improved in topics taught by collaborative CBL compared to traditional CBL

3.2.3 | Student level

Preparation

When students engage with preparation resources for CBL (C), they gain confidence in their knowledge to participate in group discussions (M). Incentivising student preparation (M) motivates students to engage with these preparation materials (M), improving engagement, participation and knowledge (O).

Preparation for participation in CBL emerged as an important mechanism for both behavioural and knowledge outcomes.^{8,16,46,47,53,59,64} Student participation in CBL was found to be driven by adequate preparatory materials and engagement with such resources.^{53,59,64} The discussions conducted during CBL were regarded as essential to participant learning, and their utility and quality were contingent on sufficient pre-intervention knowledge of students.¹⁶ The absence of this prior learning resulted in group participation being hindered by student discomfort and lack of confidence.^{16,46,47,65} Motivation to engage with preparatory materials was regarded as achievable through incentivisation, either through assessment of preparation (as in team-based learning) or increased student accountability for preparation.^{8,46,64}

"Increased preparation for ALG [active learning groups] will improve the quantity and quality of participation as suggested by our study data where students who perform better on tests of medical knowledge participate more in active learning settings. Improved participation will also facilitate better peer-to-peer teaching in this active learning setting."⁴⁶

Supported group dynamics

When students engage in CBL without effective facilitation or preparation for group work (C), a lack of trust in others' contribution creates an individualistic approach to learning (M). Changing groups regularly (C) allows students to avoid addressing group dysfunction (M). Without preparation for teamwork, students withdraw from participation (M), resulting in an unsafe learning environment (O), poor collaboration (O) and poor engagement (O).

The contribution of group dynamics and teamwork to learning within CBL interventions was highlighted in several studies.^{16,48,49,57,58} Group dysfunction resulted in students disengaging from participation in CBL where groups changed frequently, as addressing issues was seen by students as a futile exercise.⁵⁷ Facilitator training in fostering a safe, non-judgemental learning environment improved both critical thinking and teamwork.⁶⁵ Equipping students with the tools required to participate effectively and safely in a group learning exercise through group norming exercises led to more positive team dynamics.⁴⁸

"First, students did not seem to perceive that their formalized SGL [small group learning] sessions enhanced their deep learning of content through collective discovery learning, co-construction of knowledge, and productive challenging of each other's different perspectives on the material. Rather, their SGL experiences seemed to reinforce their need to identify and learn the material on their own, with the SGL sessions functioning more as a check of their knowledge than a mechanism of active, collaborative learning."⁵⁷

TABLE 7 Programme theory 7 with supporting evidence.

When CBL involves students from cultures where didactic pedagogies are more commonly utilised (C), these students can find participation difficult due to being unaccustomed to active learning methods (M). If CBL is conducted in a language other than these students' primary language (M), background noise levels and language complexity can compound this difficulty (M). This leads to poorer knowledge gains for international students (O)		
Author (year)	Quotation(s)	Outcome(s)
Holland (2019) ⁵⁵	'[...] occasional difficulties regarding overly dominant or passive group members can be present during any small group teaching session, but may be exacerbated in an environment where some students are studying complex material, and its corresponding technical vocabulary in their second, or perhaps even their third, language'	'[...] care must be taken to ensure that all students find the material easily audible, that questions are clearly defined, and that all students are encouraged to participate equally in discussions'
	In-person, classroom-based CBL demonstrated higher engagement (completion of cases) than online individual cases. Non-native English speakers found in person cases less useful and feedback received less helpful for learning	
Lestari (2023) ⁵⁶	'[...] the benefits of discussion-based learning approaches such as PBL and CBL in Asia are hampered because students prefer classical learning models, didactic lectures and memorization'	
	Interprofessional CBL activity demonstrated collaboration and learning from other professions	
Malau-Aduli (2013) ⁵⁰	'International students had significantly lower scores than their domestic counterparts, particularly in biochemistry and pharmacology. This supports existing literature and suggests that international students may not be as well adjusted to the self-directed learning style that requires critical thinking and application of knowledge [32]'	
	Domestic students in a CBL curriculum had significantly higher knowledge scores than international students in knowledge-based exam scores	

Culture and language

When CBL involves students from educational cultures where didactic pedagogies are more commonly utilised (C), these students may find participation difficult due to being unaccustomed to active learning methods (M). If CBL is conducted in a language other than these students' primary language (M), background noise levels and language complexity can compound this difficulty (M). These two factors may combine and lead to poorer knowledge gains for international students (O).

Two studies identified mechanisms affecting the success of domestic CBL interventions for international students from different educational cultures and languages.^{50,55} A statistically significant difference in knowledge outcomes was found in students participating in CBL interventions in an international educational setting compared to those in domestic settings.⁵⁰ This negative outcome was driven by student preference for more traditional didactic learning methods and being unaccustomed to the discussion-led group work required by CBL.^{50,56} The success of CBL for international students was further hampered by communication difficulties created by participation in CBL conducted in a student's second language and by practical factors such as noise levels.⁵⁵

*"International students had significantly lower scores than their domestic counterparts, particularly in biochemistry and pharmacology. This supports existing literature and suggests that international students may not be as well adjusted to the self-directed learning style that requires critical thinking and application of knowledge [32]."*⁵⁰

4 | DISCUSSION

We sought to explore how CBL works as a pedagogical approach and the underpinning contexts and mechanisms that facilitate learning. Our initial programme theories emphasised student motivation, facilitator guidance, the relevance of learning materials to future practice and the social and constructive nature of CBL as important mechanisms. While these principles remain foundational to its theoretical function, we propose mechanisms not previously included in theoretical explanations of CBL. It is particularly interesting to note that the collaborative nature of peer dialogue to facilitate learning with CBL, which has long been considered a key tenet of the pedagogy,^{17,66} does not feature in the data.

Students' learning and perceptions of CBL are influenced by the performance and trust they have in their facilitator.⁶⁷ Student preference for clinician facilitators is attributed to clinician teaching rather than adhering strictly to facilitating.⁹ Hammond et al highlighted that such didactic teaching from facilitators is opposed to the pure constructivist ideals of CBL.⁶⁸ Our review suggests that the role of a clinician facilitator goes beyond teaching students the 'right' answer and affords confidence in learning and a role model for approaching clinical problems. Clinician credibility influences learning in the clinical environment and is inherently linked to the clinical experience of the teacher.⁶⁹ Clinician facilitators draw upon their experiences, driving learning beyond case objectives or handbooks through this tacit knowledge.⁷⁰ Our findings align with previous research highlighting student preference for being guided rather than taught by clinicians while valuing their credibility and clinical experience in facilitating CBL.⁷¹

TABLE 8 Summary of CMO configurations.

First author	Context			Mechanisms							Outcomes						
	Clinician facilitator	Student preparation	Authentic cases	Changing groups	Subjective assessment	Faculty recognition	Language and educational background	Trust in facilitator	Relevance to future practice of students	Motivation		Group dynamics	K	S	B	Outcome	
										Student motivation	Faculty motivation						
Abbott ⁴³	✓					✓		✓			✓	✓	✓				Exam performance
Abdel- Wahed ⁶⁵			✓						✓		✓	✓	✓				Critical thinking, teamwork
Al-bedaery ⁴⁴			✓						✓						✓		Engagement
Braeckman ⁵⁴	✓		✓					✓	✓				✓				Exam performance
Burgess ⁸	✓	✓	✓					✓		✓					✓		Participation
Carrasco ⁴⁶	✓	✓		✓	✓				✓	✓			✓	✓			Participation, exam performance
Carrasco ⁴⁵	✓	✓		✓	✓					✓			✓				Participation, exam performance
Cendan ⁵⁹			✓			✓				✓			✓	✓			Engagement, exam performance
Christianson ⁶¹	✓		✓	✓		✓			✓		✓	✓	✓				Exam performance
Fortun ⁴⁷	✓	✓	✓	✓					✓			✓	✓	✓			Exam performance
Gold ⁶³	✓							✓						✓			Clinical reasoning
Hay ⁶⁰	✓							✓	✓				✓				Exam performance
Holland ⁵⁵							✓					✓			✓		Engagement
Kaddoura ⁶²			✓						✓				✓				Critical thinking
Kochis ⁴⁸		✓		✓								✓	✓	✓			Teamwork
Krupat ⁴⁹		✓										✓	✓				Exam performance
Lestari ⁵⁶			✓				✓		✓						✓		Collaboration
Lu ⁶⁴	✓	✓								✓							Exam performance
Malau-Aduli ⁵⁰							✓						✓				Exam performance

(Continues)

TABLE 8 (Continued)

	Context		Mechanisms							Outcomes							
	Clinician facilitator	Student preparation	Authentic cases	Changing groups	Subjective assessment	Faculty recognition	Language and educational background	Trust in facilitator	Relevance to future practice of students	Motivation		Group dynamics	K	S	B	Outcome	
										Student motivation	Faculty motivation						
First author																	
Nordquist ¹⁶	✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	Engagement, exam performance	
Osborne ⁵¹	✓		✓						✓						✓	Collaboration	
Park ⁵⁷	✓	✓		✓	✓			✓	✓	✓		✓	✓	✓	✓	Engagement	
Sartania ⁵⁸		✓	✓						✓	✓		✓	✓	✓	✓	Engagement, exam performance	
Sutyak ⁵²	✓		✓					✓	✓						✓	Clinical reasoning	
Yoo ⁵³	✓	✓	✓					✓	✓					✓	✓	Communication	

Authenticity is a core mechanism by which students engage with the learning opportunities of a case and link their learning to future clinical practice.^{2,5,67} The presentation of realistic clinical circumstances engages students and causes reflection on both knowledge and knowledge gaps, driving learning. Authentic clinical cases encompass the scientific, clinical and social domains and provide an early opportunity for students to encounter patients, consider their future role and develop their learning across these areas.^{15,44,72} Our review demonstrates that authentic clinical cases facilitate successful learning for CBL participants where they can see themselves in the role of the healthcare professional.

While facilitator training is important for the successful operation of CBL,⁶⁸ we demonstrate institutional support of faculty also motivates positive engagement, leading to better learning outcomes. Conversely, where institutional support of faculty involvement in CBL is lacking, a hostile learning environment and negative learning may result.¹⁶ The reticence of academic faculty to participate in CBL represents a significant hurdle to its implementation, already a resource-intensive pedagogical approach.^{2,18} Research into faculty motivation in CBL at our own institution aligns with this theory and further situates the importance of faculty investment for involvement. Faculty workload and competing time considerations have been raised as factors impacting on positive faculty engagement.⁷³ Our research indicates that institutional support and recognition of faculty time, effort and contribution to CBL facilitation result in positive engagement and improved learning outcomes.

We demonstrate student motivation to engage in CBL to be dependent on meaningful preparation. While not found in either of our initial programme theories, student preparation was important for learning and engagement.^{5,6,16} Our findings demonstrate that recognition of student efforts through assessment of and accountability for preparation develop motivation for participation in CBL. This preparation necessitates consideration that the collaborative learning as highlighted by Thistlethwaite et al² seems to be contingent on the learning which a student brings with them into a CBL session, rather than arising constructively from group discussion. Pre-class readiness testing is a feature of the TBL structure, so a merging of the features of the methods may be useful.

Unsurprisingly, group dysfunction can reduce learning in CBL. Group dysfunction creates an unsafe learning environment and undermines collaboration. Psychological safety is required for students to volunteer information and engage in peer discussions,⁷⁴ all important elements to the success of CBL.⁶⁷ Without appropriate institutional and facilitator supports, CBL groups can foster negative group social dynamics and individualistic learning over collaboration between students. This is particularly evident where CBL groups change regularly, allowing students to opt out of addressing negative group dynamics while awaiting a different group. Subjective assessment of performance in CBL may also deter from a focus on learning by motivating students to influence their grading. Peer assessment of students in CBL has not been demonstrated to significantly correlate to academic performance, driven by a variance of contribution from different students fostering group dysfunction.⁷⁵ Structuring assessment around

behavioural activities creates opportunity for performative participation, jeopardising group dynamics and knowledge gains.⁵⁷ While assessment undeniably motivates students, it can also engage students in tasks for the betterment of their future clinical practice.⁷⁶ Our findings demonstrate the optimal use of assessment in CBL involves more than one domain of learning to enhance both learning and teamwork in future healthcare professionals.

Our findings show that student discomfort can lead to poorer learning outcomes from CBL for students from educational backgrounds where didactic teaching methods are more prevalent. Students more accustomed to a didactic curriculum may find engaging with active learning interventions and group work uncomfortable.⁷⁷ Participation in CBL in a student's second language can also challenge learning achieved, compounded by ambient noise and complex medical language. These findings mirror problem-based learning literature regarding globalisation and the need to develop adaptive models of active learning methods.^{78,79} The global shift towards standardisation of medical education across all educational settings and contexts warrants further consideration of local differences and values.⁸⁰ Our findings demonstrate a need for CBL programmes to be adaptable to be successful for all students.

4.1 | Methodological strengths and challenges

A strength of this review is the realist methodology, which accommodated exploration of the interplay of factors impacting successful CBL implementation. Our focus on outcome-based studies also strengthened the evidence provided by the review and addressed a noted gap in the CBL literature. Publication bias limiting data available on negative outcomes is a limitation of this study. Positive findings predominated the literature which may have limited discovery of more problematic mechanisms driving negative outcomes for CBL interventions. Our findings were specific to the implementation and operation of CBL embedded in undergraduate HPE education, limiting transferability to other contexts such as postgraduate education. To further test and refine the programme theories created in this review, a realist evaluation involving key CBL stakeholders is needed to further elucidate these mechanisms.

5 | CONCLUSIONS

Our study identifies key contexts and interventions impacting on how CBL interventions work, beyond ALT and IBLT. The authenticity of CBL motivates student engagement and learning; however, it should relate to both cases presented and guidance from clinical facilitators. A lack of institutional support of faculty creates negative learning outcomes from CBL, requiring acknowledgement of the time involved and academic advancement opportunities for facilitators. Assessment of behavioural performance warrants careful integration into CBL, as its subjectivity can result in student motivation to influence individual grades rather than learn collaboratively. Our review provides

important evidence and insights for educators and curriculum developers to provide a CBL programme that results in improved academic, skill and behavioural outcomes.

AUTHOR CONTRIBUTIONS

Ronan Daly: Conceptualisation; investigation; writing – original draft; methodology; writing – review and editing; formal analysis. **Elizabeth Tunney:** Investigation; formal analysis. **Muirne Spooner:** Conceptualisation; methodology; writing – review and editing; supervision. **Gozie Offiah:** Conceptualisation; methodology; writing – review and editing; supervision. **Karen Flood:** Conceptualisation; methodology; writing – review and editing; supervision. **Fiona Kent:** Conceptualisation; methodology; writing – review and editing; supervision.

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CONFLICT OF INTEREST STATEMENT

The authors have no competing interests to declare.

DATA AVAILABILITY STATEMENT

The data that supports the findings of this study are available in the [Supporting Information](#) of this article.

ETHICS STATEMENT

Not applicable.

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REFERENCES

- Loftus S. Case-based learning. In: Huggett KN, Quesnelle KM, Jeffries WB, eds. *An Introduction to Medical Teaching: The Foundations of Curriculum Design, Delivery, and Assessment*. Springer International Publishing; 2022:99-113.
- Thistlethwaite JE, Davies D, Ekeocha S, et al. The effectiveness of case-based learning in health professional education. A BEME systematic review: BEME guide no. 23. *Med Teach*. 2012;34(6):e421-e444. doi:[10.3109/0142159X.2012.680939](https://doi.org/10.3109/0142159X.2012.680939)
- Das S, Das A, Rai P, Kumar N. Case-based learning: modern teaching tool meant for present curriculum: a behavioral analysis from faculties' perspective. *J Educ Health Promot*. 2021;10:372. doi:[10.4103/jehp.jehp_1265_20](https://doi.org/10.4103/jehp.jehp_1265_20)
- Hoffer ER. Case-based teaching: using stories for engagement and inclusion. *Int J Soc Educ Sci*. 2020;2(2):75-80.
- McLean SF. Case-based learning and its application in medical and health-care fields: a review of worldwide literature. *J Med Educat Curri Develop*. 2016;3:JMECD.S20377. doi:[10.4137/JMECD.S20377](https://doi.org/10.4137/JMECD.S20377)
- Maia D, Andrade R, Afonso J, Costa P, Valente C, Espregueira-Mendes J. Academic performance and perceptions of undergraduate medical students in case-based learning compared to other teaching strategies: a systematic review with meta-analysis. *Educ Sci*. 2023;13(3):238. doi:[10.3390/educsci13030238](https://doi.org/10.3390/educsci13030238)

7. Haley CM, Brown B, Koerber A, Nicholas CL, Belcher A. Comparing case-based with team-based learning: dental students' satisfaction, level of learning, and resources needed. *J Dent Educ.* 2020;84(4):486-494. doi:[10.21815/JDE.019.190](https://doi.org/10.21815/JDE.019.190)
8. Burgess A, Matar E, Roberts C, et al. Scaffolding medical student knowledge and skills: team-based learning (TBL) and case-based learning (CBL). *BMC Med Educ.* 2021;21(1):238. doi:[10.1186/s12909-021-02638-3](https://doi.org/10.1186/s12909-021-02638-3)
9. Srinivasan M, Wilkes M, Stevenson F, Nguyen T, Slavin S. Comparing problem-based learning with case-based learning: effects of a major curricular shift at two institutions. *Acad Med.* 2007;82(1):74-82.
10. Burgess A, Bleasel J, Haq I, et al. Team-based learning (TBL) in the medical curriculum: better than PBL? *BMC Med Educ.* 2017;17(1):243. doi:[10.1186/s12909-017-1068-z](https://doi.org/10.1186/s12909-017-1068-z)
11. Cen XY, Hua Y, Niu S, Yu T. Application of case-based learning in medical student education: a meta-analysis. *Eur Rev Med Pharmacol Sci.* 2021;25(8):3173-3181. doi:[10.26355/eurrev_202104_25726](https://doi.org/10.26355/eurrev_202104_25726)
12. Tsekhmister Y. Effectiveness of case-based learning in medical and pharmacy education: a meta-analysis. *Electron J Gen Med.* 2023;20(5):em515. doi:[10.29333/ejgm/13315](https://doi.org/10.29333/ejgm/13315)
13. Perez A, Howey M, Green JL, et al. Multiple cases in case-based learning: a qualitative description study. *Eur J Dent Educ.* 2023;27(4):1067-1076. doi:[10.1111/eje.12900](https://doi.org/10.1111/eje.12900)
14. George T, Carey RAB, Abraham OC, Sebastian T, Faith MF. Trainee doctors in medicine prefer case-based learning compared to didactic teaching. *J Family Med Prim Care.* 2020;9(2):580-584. doi:[10.4103/jfmpc.jfmpc_1093_19](https://doi.org/10.4103/jfmpc.jfmpc_1093_19)
15. Kim S, Phillips WR, Pinsky L, Brock D, Phillips K, Keary J. A conceptual framework for developing teaching cases: a review and synthesis of the literature across disciplines. *Med Educ.* 2006;40(9):867-876.
16. Nordquist J, Sundberg K, Johansson L, Sandelin K, Nordenström J. Case-based learning in surgery: lessons learned. *World J Surg.* 2012;36(5):945-955. doi:[10.1007/s00268-011-1396-9](https://doi.org/10.1007/s00268-011-1396-9)
17. Williams B. Case based learning—a review of the literature: is there scope for this educational paradigm in prehospital education? *Emerg Med J.* 2005;22(8):577-581. doi:[10.1136/emj.2004.022707](https://doi.org/10.1136/emj.2004.022707)
18. Garg PV, Amrit. Faculty perception regarding case based learning – a qualitative study. *Int J Life Sci Biotechnol Pharma Res.* 2023;12(1):119-124.
19. Sule R. Medical students and faculty perceptions towards a case based learning intervention at an Indian medical college. McMaster University. 2016.
20. Gwee MC. Globalization of problem-based learning (PBL): cross-cultural implications. *Kaohsiung J Med Sci.* 2008;24(3 Suppl):S14-S22. doi:[10.1016/S1607-551X\(08\)70089-5](https://doi.org/10.1016/S1607-551X(08)70089-5)
21. Jacob SA, Dhing OH, Malone D. Perceptions of Australian and Malaysian educators in an undergraduate pharmacy program on case-based learning. *Am J Pharm Educ.* 2019;83(3):6597. doi:[10.5688/ajpe6597](https://doi.org/10.5688/ajpe6597)
22. Rycroft-Malone J, McCormack B, et al. Realist synthesis: illustrating the method for implementation research. *Implement Sci.* 2012;7(1):33.
23. Mukumbang FC, Marchal B, Van Belle S, van Wyk B. Using the realist interview approach to maintain theoretical awareness in realist studies. *Qual Res.* 2020;20(4):485-515.
24. Pawson R, Greenhalgh T, Harvey G, Walshe K. *Realist Synthesis: An Introduction.* University of Manchester; 2004.
25. Pawson R, Tilley N. *Realistic Evaluation.* Sage; 1997.
26. Dalkin SM, Greenhalgh J, Jones D, Cunningham B, Lhussier M. What's in a mechanism? Development of a key concept in realist evaluation. *Implement Sci.* 2015;10(1):49. doi:[10.1186/s13012-015-0237-x](https://doi.org/10.1186/s13012-015-0237-x)
27. McCormack Z, Kerr A, Leigh G, Simpson A, Keating D, Strawbridge J. Exploring what works in mental health education for health profession students: a realist review. *BMC Med Educ.* 2025;25(1):673. doi:[10.1186/s12909-025-07222-7](https://doi.org/10.1186/s12909-025-07222-7)
28. De Brún A, McAuliffe E. Identifying the context, mechanisms and outcomes underlying collective leadership in teams: building a realist programme theory. *BMC Health Serv Res.* 2020;20(1):261. doi:[10.1186/s12913-020-05129-1](https://doi.org/10.1186/s12913-020-05129-1)
29. Davies F, Wood F, Bullock A, Wallace C, Edwards A. Shifting mindsets: a realist synthesis of evidence from self-management support training. *Med Educ.* 2018;52(3):274-287. doi:[10.1111/medu.13492](https://doi.org/10.1111/medu.13492)
30. De Weger E, Van Vooren NJE, Wong G, et al. What's in a realist configuration? Deciding which causal configurations to use, how, and why. *Int J Qual Methods.* 2020;19:1609406920938577. doi:[10.1177/1609406920938577](https://doi.org/10.1177/1609406920938577)
31. Pawson R, Greenhalgh T, Harvey G, Walshe K. Realist review—a new method of systematic review designed for complex policy interventions. *J Health Serv Res Policy.* 2005;10(Suppl 1):21-34.
32. Wong G, Greenhalgh T, Westhorp G, Buckingham J, Pawson R. Ramesses publication standards: realist syntheses. *BMC Med.* 2013;11(1):21. doi:[10.1186/1741-7015-11-21](https://doi.org/10.1186/1741-7015-11-21)
33. Taylor DCM, Hamdy H. Adult learning theories: implications for learning and teaching in medical education: AMEE guide no. 83. *Med Teach.* 2013;35(11):e1561-e1572. doi:[10.3109/0142159X.2013.828153](https://doi.org/10.3109/0142159X.2013.828153)
34. Meijerman I, Nab J, Koster AS. Designing and implementing an inquiry-based undergraduate curriculum in pharmaceutical sciences. *Curr Pharm Teach Learn.* 2016;8(6):905-919. doi:[10.1016/j.cptl.2016.08.001](https://doi.org/10.1016/j.cptl.2016.08.001)
35. Ellaway R. eMedical teacher. *Med Teach.* 2008;30(1):112-113.
36. Sutherland L, Markauskaite L. Examining the role of authenticity in supporting the development of professional identity: an example from teacher education. *High Educ.* 2012;64(6):747-766. doi:[10.1007/s10734-012-9522-7](https://doi.org/10.1007/s10734-012-9522-7)
37. Fredholm A, Manninen K, Hjelmqvist H, Silén C. Authenticity made visible in medical students' experiences of feeling like a doctor. *Int J Med Educ.* 2019;10:113-121. doi:[10.5116/ijme.5cf7.d60c](https://doi.org/10.5116/ijme.5cf7.d60c)
38. Kirkpatrick JD, Kirkpatrick WK. *Kirkpatrick's Four Levels of Training Evaluation.* Association for Talent Development; 2016.
39. Allen LM, Hay M, Palermo C. Evaluation in health professions education—is measuring outcomes enough? *Med Educ.* 2022;56(1):127-136. doi:[10.1111/medu.14654](https://doi.org/10.1111/medu.14654)
40. Endnote 21. Philadelphia, USA: Clarivate Analytics; 2025.
41. Covidence systematic review software. Melbourne, Australia: Veritas Health Innovation; 2025.
42. Dada S, Dalkin S, Gilmore B, Hunter R, Mukumbang FC. Applying and reporting relevance, richness and rigour in realist evidence appraisals: advancing key concepts in realist reviews. *Res Synth Methods.* 2023;14(3):504-514. doi:[10.1002/jrsm.1630](https://doi.org/10.1002/jrsm.1630)
43. Abbott A, Sullivan M, Nyquist J, Mylona E, Taylor C. A “medical student practice profile” as the foundation for a case-based curriculum revision. *Teach Learn Med.* 2010;22(4):307-311. doi:[10.1080/10401334.2010.512834](https://doi.org/10.1080/10401334.2010.512834)
44. Al-bedaery R, Baig S, Khare Y, Sullivan-Mchale J. Humanising case-based learning. *Med Teach.* 2024;46(10):1348-1355. doi:[10.1080/0142159X.2024.2308066](https://doi.org/10.1080/0142159X.2024.2308066)
45. Carrasco GA, Behling KC, Lopez O. Weekly team-based learning scores and participation are better predictors of successful course performance than case-based learning performance: role of assessment incentive structure. *BMC Med Educ.* 2021;21(1):521. doi:[10.1186/s12909-021-02948-6](https://doi.org/10.1186/s12909-021-02948-6)
46. Carrasco GA, Behling KC, Lopez OJ. Evaluation of the role of incentive structure on student participation and performance in active learning strategies: a comparison of case-based and team-based learning. *Med Teach.* 2018;40(4):379-386. doi:[10.1080/0142159X.2017.1408899](https://doi.org/10.1080/0142159X.2017.1408899)

47. Fortun J, Cecilia MA, Tempest HG. Introduction and evaluation of case-based learning in the first foundational course of an undergraduate medical curriculum. *J Biol Educ*. 2017;51(3):295-304.
48. Kochis M, Kamin D, Cockrill B, Besche H. Understanding and optimizing group dynamics in case-based collaborative learning. *Med Sci Educ*. 2021;31(6):1779-1788. doi:10.1007/s40670-021-01367-y
49. Krupat E, Richards JB, Sullivan AM, Fleenor TJ Jr, Schwartzstein RM. Assessing the effectiveness of case-based collaborative learning via randomized controlled trial. *Acad Med*. 2016;91(5):723-729. doi:10.1097/ACM.0000000000001004
50. Malau-Aduli BS, Lee AY, Cooling N, Catchpole M, Jose M, Turner R. Retention of knowledge and perceived relevance of basic sciences in an integrated case-based learning (CBL) curriculum. *BMC Med Educ*. 2013;13(1):139. doi:10.1186/1472-6920-13-139
51. Osborne F, Harrison M, Fisher J, Bateman B. Using medical reality television as a technology-enhanced learning strategy to provide authentic patient care experiences during clinical placements: a case study research investigation. *BMC Med Educ*. 2021;21(1):15. doi:10.1186/s12909-020-02432-7
52. Sutyak JP, Lebeau RB, O'Donnell AM. Unstructured cases in case-based learning benefit students with primary care career preferences. *Am J Surg*. 1998;175(6):503-507.
53. Yoo M-S, Park H-R. Effects of case-based learning on communication skills, problem-solving ability, and learning motivation in nursing students. *Nurs Health Sci*. 2015;17(2):166-172. doi:10.1111/nhs.12151
54. Braeckman L, Kint L, Bekaert M, Cobbaut L, Janssens H. Comparison of two case-based learning conditions with real patients in teaching occupational medicine. *Med Teach*. 2014;36(4):340-346. doi:10.3109/0142159X.2014.887833
55. Holland JC, Pawlikowska T. Undergraduate medical students' usage and perceptions of anatomical case-based learning: comparison of facilitated small group discussions and eLearning resources. *Anat Sci Educ*. 2019;12(3):245-256. doi:10.1002/ase.1824
56. Lestari E, Rahmawatie DA, Wulandari CL. Does online Interprofessional case-based learning facilitate collaborative knowledge construction? *J Multidiscip Healthc*. 2023;16:85-99. doi:10.2147/JMDH.S391997
57. Park C, Wu C, Regehr G. Shining a light into the black box of group learning: medical students' experiences and perceptions of small groups. *Acad Med*. 2020;95(6):919-924. doi:10.1097/ACM.0000000000003099
58. Sartania N, Sneddon S, Boyle JG, McQuarrie E, de Koning HP. Increasing collaborative discussion in case-based learning improves student engagement and knowledge acquisition. *Med Sci Educ*. 2022;32(5):1055-1064. doi:10.1007/s40670-022-01614-w
59. Cendan JC, Silver M, Ben-David K. Changing the student clerkship from traditional lectures to small group case-based sessions benefits the student and the faculty. *J Surg Educ*. 2011;68(2):117-120. doi:10.1016/j.jsurg.2010.09.011
60. Hay PJ, Katsikitis M. The 'expert' in problem-based and case-based learning: necessary or not? *Med Educ*. 2001;35(1):22-26. doi:10.1046/j.1365-2923.2001.00679.x
61. Christianson CE, McBride RB, Vari RC, Olson L, Wilson HD. From traditional to patient-centered learning: curriculum change as an intervention for changing institutional culture and promoting professionalism in undergraduate medical education. *Acad Med*. 2007;82(11):1079-1088.
62. Kaddoura MA. Critical thinking skills of nursing students in lecture-based teaching and case-based learning. *IJ-SoTL*. 2011;5(2):n2.
63. Gold JM, Collazo RA, Athauda G, Obeso VT, Toonkel RL. Taking CBL to the lecture hall: a comparison of outcomes between traditional small group CBL and a novel large group team-based CBL teaching method. *Med Sci Educ*. 2020;30(1):227-233. doi:10.1007/s40670-019-00871-6
64. Lu GF, Huang MQ, Geng F. The application of case-based learning with microlectures and flipped classroom teaching methods in the teaching of physiology to nursing undergraduates. *Innov Educ Teach Int*. 2024;62(4):1149-1162. doi:10.1080/14703297.2024.2357711
65. Abdel-Wahed N, Badahdah A, Qutob AF, Bahanan L, Bukhary SMN. The effectiveness of integrating role play into case-based learning in dental education: enhancing critical thinking and teamwork skills. *BMC Med Educ*. 2024;24(1):1531. doi:10.1186/s12909-024-06550-4
66. Sivanjali M, Arulpragasam AN. Why include case-based learning in the medical curriculum? – a review. *Southeast Asian J Med Educ*. 2023;17(2): 10.
67. Gasim MS, Ibrahim MH, Abushama WA, Hamed IM, Ali IA. Medical students' perceptions towards implementing case-based learning in the clinical teaching and clerkship training. *BMC Med Educ*. 2024;24(1):200. doi:10.1186/s12909-024-05183-x
68. Hammond L, Berg C, Howard B, Diug B, Sorinola O. What is the role and value of facilitation in case-based learning (CBL) in undergraduate medicine: a scoping review of the literature. *Educ Health Prof*. 2023;6(3):139-150.
69. Watling C, Driessen E, van der Vleuten CPM, Lingard L. Learning from clinical work: the roles of learning cues and credibility judgements. *Med Educ*. 2012;46(2):192-200. doi:10.1111/j.1365-2923.2011.04126.x
70. Moen J, Shuck C. Medical educator teaching habits: origins, decisions, and strategies—a phenomenological inquiry (METHODS-PI). *Discov Educ*. 2024;3(1):253.
71. Bruen C, Illing J, Daly R, et al. Medical student experiences of case-based learning (CBL) at a multicultural medical school. *BMC Med Educ*. 2025;25(1):152. doi:10.1186/s12909-024-06585-7
72. Bruner LP, Szymik B, House E, Chappell MT, Teshager D, Baldwin A. Curating a case catalog: development and implementation of a process for revising small group teaching cases for pre-clerkship medical education. *Med Sci Educ*. 2023;33(1):215-222. doi:10.1007/s40670-022-01681-z
73. Delany C, Illing J, McIlroy M, et al. Exploring the lived experience of faculty implementing case-based learning: a phenomenological study. *BMC Med Educ*. 2025;25(1):892. doi:10.1186/s12909-025-07364-8
74. McClintock AH, Fainstad T, Blau K, Jauregui J. Psychological safety in medical education: a scoping review and synthesis of the literature. *Med Teach*. 2023;45(11):1290-1299. doi:10.1080/0142159X.2023.2216863
75. Jahns H, Zintl A. Evaluation of student engagement, communication, and collaboration during online group work: experiences of fourth-year veterinary medicine students. *J Vet Med Educ*. 2024;51(1):130-140. doi:10.3138/jvme-2022-0041
76. Scott IM. Beyond 'driving': the relationship between assessment, performance and learning. *Med Educ*. 2020;54(1):54-59. doi:10.1111/medu.13935
77. Choon-Eng Gwee M. Globalization of problem-based learning (PBL): cross-cultural implications. *Kaohsiung J Med Sci*. 2008;24(3, Supplement):S14-S22.
78. Frambach JM, Driessen EW, Chan LC, van der Vleuten CP. Rethinking the globalisation of problem-based learning: how culture challenges self-directed learning. *Med Educ*. 2012;46(8):738-747. doi:10.1111/j.1365-2923.2012.04290.x
79. Frambach JM, Talaat W, Wasenitz S, Martimianakis MAT. The case for plural PBL: an analysis of dominant and marginalized perspectives in the globalization of problem-based learning. *Adv Health Sci Educ Theory Pract*. 2019;24(5):931-942. doi:10.1007/s10459-019-09930-4

80. Brouwer E, Driessen E, Mamat NH, Nadarajah VD, Somodi K, Frambach J. Educating universal professionals or global physicians? A multi-centre study of international medical programmes design. *Med Teach*. 2020;42(2):221-227. doi:[10.1080/0142159X.2019.1676885](https://doi.org/10.1080/0142159X.2019.1676885)

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