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Adoption of Problem-Based Learning in Medical Schools in Non-Western Countries: A Systematic Review

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ABSTRACT

Phenomenon: In recent decades, medical education practices developed in Western countries have been widely adopted in non-Western countries. Problem-based Learning (PBL) was first developed in North America and it relies on Western educational and cultural values, thereby raising concerns about its ‘lift and shift’ to non-Western settings. **Approach:** This review systematically identified and interpretively synthesized studies on students’ and teachers’ experiences of PBL in non-Western medical schools. Three databases (ERIC, PsycINFO, and MEDLINE) were searched. Forty-one articles were assessed for quality using the Critical Appraisal Skills Program (CASP) checklist and synthesized using meta-ethnography. The final synthesis represented over 5,400 participants from 18 countries. **Findings:** Findings were categorized into three different constructs: *Student Engagement*, *Tutor Skills*, and *Organization and Planning*. Our synthesis demonstrates that medical students and teachers in non-Western countries have varied experiences of PBL. Students engage variably with PBL, consider knowledge to be better acquired from authoritative figures, and deem PBL to be ineffective for assessment preparation. Student participation is limited by linguistic challenges when they are not native English speakers. Teachers are often unfamiliar with the underlying philosophical assumptions of PBL and struggle with the facilitation style needed. Both students and teachers have developed modifications to ensure that PBL better fits in their local settings. **Insights:** Given the significant adjustments and resource requirements needed to adopt PBL, medical school leaders and policy makers in non-Western countries should carefully consider possible consequences of its implementation for their students and teachers, and proactively consider ways to ‘hybridize’ it for local contexts.

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Introduction


What is PBL?

Problem-Based Learning (PBL) is an approach where clinical problems are presented at the beginning of students’ learning processes to increase their problem-solving and clinical reasoning skills.^{1,2} It is based on the concept of “student-centered” learning, with teachers playing a key role to facilitate student discussions and strengthen group dynamics.³ Based on authentic and appropriate scenarios, students actively participate and collaborate within small groups to identify learning objectives and subsequently acquire relevant knowledge.⁴ The aim of PBL is to foster students to be life-long learners and effective communicators.^{2,4}

History of PBL in medical schools

PBL was developed by Howard Barrows and his colleagues at McMaster University in Canada in the 1960s.⁵ This learning method has since been widely adopted in health professionals’ education in North America and Europe.⁶ Specifically in medical schools, the advent of PBL has spawned a growing body of literature that attempts to evaluate its effectiveness.⁷ On the one hand, systematic reviews have shown benefits on students’ knowledge application and improved teamwork and communication skills.^{8,9} On the other hand, both students and teachers have encountered challenges with this new learning method. For students, there is often poor participation in discussions.^{10,11} For teachers, it has been recognized that

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there is often minimal understanding about their “new” roles as facilitators.^{12,13}

Despite these mixed reviews, PBL has been widely implemented as a curriculum-wide or a single-course teaching method in many medical schools in non-Western countries. The intention is to enhance students’ learning experiences through a Western innovative learning approach.⁶ Several accreditation agencies in Southeast Asia and Africa have also incorporated PBL curricula as a national accreditation standard.¹⁴

Globalization and PBL

Overall, Western medical education is advancing into medical schools around the world. This is exemplified by the global standards for medical education in undergraduate and postgraduate levels, such as those developed by the World Federation for Medical Education.¹⁵ However, the intention of developing international standards and curricula poses concerns about whose knowledge forms the basis of the expertise and whether these expected learner outcomes are applicable to students with different language and cultural backgrounds.¹⁶ These medical education approaches, including PBL, are often developed based upon Western cultural attitudes that do not necessarily account for cultural variations and interests. Specifically, it has been suggested that non-Western countries struggle with the Western- ingrained educational assumptions regarding students’ learning behaviors and teachers’ facilitation methods that accompany these curricular innovations. This is especially apparent in PBL.¹⁷

Comparative research on the impacts of globalization on medical education is crucial.¹⁸ Such cross-cultural studies explore the diverse practices and unique values that underpin medical competency in different countries.¹⁹ The goal should be to steer away from initiating formal processes that constrict everyone to similar methods and attitudes toward medical education. Instead, adjustments and strategies should be in place to ensure that implementation of Western educational approaches are not at the expense of re-socialization of learners and do not sacrifice local cultural nuances.⁶ PBL should be considered as a learning approach open to interpretation based on individual contextualization in order to reflect the cultural and situational nuances of where it is being implemented.¹⁴

Currently, there is limited literature focusing on globalization and cross-cultural applicability of PBL in non-Western countries. Most published papers focusing on PBL implementation in non-Western

countries are conducted in individual institutions or within a single country. Although the definition of non-Western can be contentious, it is mostly agreed as countries outside North America, Western Europe, and Australasia which do not have significant Western civilizational heritage.²⁰ Suggested by Frambach,²¹ research is needed to focus on the lift and shift of PBL across different cultural regions and beyond the implementation stages. Furthermore, existing literature has mostly adopted external objective methods, such as knowledge and skills assessments, to quantitatively evaluate effectiveness of PBL which is insufficient in exploring subjective perspectives from students and educators.²²

Aim

Our research question for the systematic review is as follows: *What are students’ and teachers’ experiences of PBL approaches in undergraduate medical programs in non-Western countries?*

Methods

We used meta-ethnography to synthesize findings from qualitative studies in educational research.²³ Meta-ethnography was developed by Noblit and Hare to provide a comprehensive insight into a research topic by interpreting results of individual studies and creating a new conceptual understanding of the subject.^{23,24}

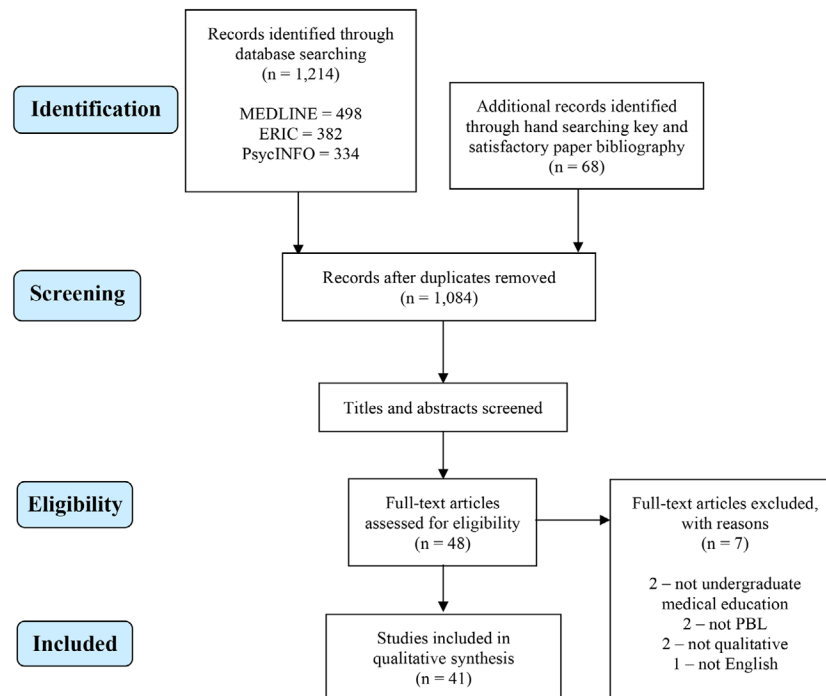
Selection of studies for inclusion

We systematically searched for relevant articles in three databases (PsycINFO, MEDLINE, and ERIC). These databases were chosen to maximize the opportunity to identify articles from both clinical and non-clinical journals, as medical education research is published in both biomedical and social science journals. For PsycINFO and MEDLINE, the search criteria comprised of terms including “problem-based learning,” “medical education,” and “qualitative” and their variations. The exact terminologies are detailed in Table 1. They were combined using Boolean logic terms using “OR” within the groups and “AND” between the groups. For ERIC, the terms: “problem-based learning,” “medical education,” “medical students” and “qualitative” were used.

Conducted in April 2020, we did not limit the results to a date range. However, it was restricted to articles written in English and published in peer-reviewed journals. The results from each database are shown in Figure 1. It is recognized that qualitative

Table 1. Search terms and strategies used for database searching.

Database	Search strategy
PsycINFO	((“problem based learning” OR “problem-based learning” OR “problem oriented learning” OR “problem-oriented learning” OR “problem-based method” OR “problem based method” OR “problem-based methods” OR “problem based methods”) AND (“focus group” OR “focus groups” OR interview* OR qualitative OR transcript*) AND (“medical school” OR “medical schools” OR “medical education” OR “medical curriculum” OR “medical curricula” OR “medical student” OR “medical students”))
MEDLINE	((“problem based learning” OR “problem-based learning” OR “problem oriented learning” OR “problem-oriented learning” OR “problem-based method” OR “problem based method” OR “problem-based methods” OR “problem based methods”) AND (“focus group” OR “focus groups” OR interview* OR qualitative OR transcript*) AND (“medical school” OR “medical schools” OR “medical education” OR “medical curriculum” OR “medical curricula” OR “medical student” OR “medical students”))
ERIC	“problem-based learning” “medical education” “medical students” “qualitative”

**Figure 1.** PRISMA (Preferred Reporting Items for Systematic Reviews and Meta Analyses) flowchart.

studies can be difficult to identify, and one cannot rely on database searching alone.²⁴ “Snowballing” was therefore used to find relevant studies which involved analyzing the reference lists of identified articles as well as searching for studies that have cited the specific identified article.²⁵

After the removal of duplicates, all 1,084 titles and abstracts from database search were screened by one reviewer (SCCC). A subset (10%) was independently screened by a second reviewer (GC) with no discrepancies in selection. Studies that were excluded on the basis of title and abstract typically did not use qualitative methodologies or did not focus on PBL. Following initial screening, 48 full text articles were obtained and assessed for inclusion by two reviewers (SCCC and MAR), who both agreed on final inclusion and exclusion criteria detailed in [Table 2](#).

Forty-one articles met the defined inclusion criteria and were included in the meta-ethnography. [Figure 1](#)

summarizes the systematic review process using a flowchart based on the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) guidance.²⁶ [Supplement Table](#) details the 41 articles included in the synthesis. The review incorporated data from over 5,100 students and 360 facilitators in 18 different countries from Asia, Africa, and the Middle East.

Critical appraisal

To maintain rigor and transparency, all included articles were appraised independently by two reviewers (SCCC and ARG) using the Critical Appraisal Skills Program qualitative research checklist.²⁷ This checklist ensures that any articles with poor methodology were excluded in the synthesis. All 41 articles scored between 65% and 100% on the Critical Appraisal Skills Program checklist and therefore no articles were excluded on the grounds of poor quality (<50%).²⁷

Table 2. Selection criteria used to guide screening of articles.

Inclusion	Exclusion
Empirical study published in English	Study conducted in Northern America, Europe and Australasia
Study focused on problem-based learning as a learning method	Systematic reviews/ Conference abstracts/books
Study involved undergraduate medical students only (basic medical education/qualification)	
Study adopted a qualitative study design (inclusive of mixed method papers)	

We also assessed our included articles according to their relevance to our research question using the criteria set out by Dixon- Woods and colleagues.²⁸ Articles were either classified as a “Key Paper”—where its content closely mirrored the topic of our research question—or a “Satisfactory Paper”—where its content provided a smaller contribution to our synthesis. This classification was agreed upon by two researchers (SCCC and MAR) and is presented in [Supplement Table](#). We assigned six articles as “Key Papers” (KP) and the remaining 35 articles as “Satisfactory Papers” (SAT).

Synthesis

The included studies were synthesized using a meta-ethnographic approach as described by Noblit and Hare. Direct quotations from research participants are known as “first-order constructs.” The interpretations of these “first-order constructs” from the authors are known as “second-order constructs.” The “second-order constructs” were subsequently compiled and interpreted by the reviewers to derive themes known as “third-order constructs.”²⁹ These “third-order constructs” were developed into an overarching explanatory model to discuss key concepts across the articles. Subsequently, using the line of argument synthesis, the conclusions drawn from these selected articles were brought together in a new interpretation.

Positionality statement

Reflexivity can be described as the “turning of the researcher lens back onto oneself to recognize and take responsibility for one’s own situatedness within the research.”³⁰ (p.2) The review team comprises of medical educators based in a single Western country. However, we all have personal backgrounds from various non-Western countries and teaching and learning experiences in different parts of the world. Throughout the research and data analysis, we were mindful of our positions as both “insiders” and “outsiders.”

Having grown up in Hong Kong, SCCC, and GC observed the paternalistic approach to education

during their primary and secondary schooling. ARG and MAR also have close family members in different parts of Southeast Asia and had experiences with PBL sessions in non-Western countries. Through international partnerships, MAR worked closely with medical educators from different non-Western countries (China, Southeast Asia, and Middle East) who have developed, implemented, and evaluated PBL approaches in their medical schools. We all undertook our medical training in the UK with various experiences of PBL in our undergraduate curricula. We were motivated to formally investigate how our educational experiences contrast with student and teachers’ PBL experiences in non-Western countries.

Results

Using Noblit and Hare’s meta-ethnographic approach detailed above, we identified a total of 15 second-order constructs across the 41 articles. These are detailed in [Table 3](#), along with the articles from which they arise, and examples of first-order constructs. We grouped the second-order constructs into those related to:

- Students’ experiences of PBL
- Teachers’ experiences of PBL
- The student-teacher relationship
- Course structure and organization

Students’ experiences of PBL

Students’ experiences of PBL mostly pertained to their approaches to learning ([Table 3](#)). Their participation and engagement were dependent on several factors, including whether the discussion was held in their native language and whether the students were being assessed in these discussions.

On the one hand, many students were reluctant to engage in group discussions; “Most of us Africans, we don’t just speak.”³² (p.305) They perceived working with others to be ineffective and preferred to work individually in order to have full control over their learning. Students tended to be assessment orientated and felt that collective brainstorming in PBL sessions

Table 3. Table collating the formulated themes by researchers based on second-order constructs extracted from research articles.

	Second-order constructs	Example of first-order constructs	Article references
Students' experiences of PBL	Participation and Engagement	"During discussion, there are one or two students who actively participate in the discussion, but the others are reluctant to participate in the discussion." ⁶ "In PBL, we (students) learn by searching and discussions." ^{31(p.1336)}	6,7,21,31-45
	Motivation for Learning	"Some students are not interested, if feels like they don't want to be there." ^{46(p.462)}	6,7,21,33,38,39,43,46-48
	Acquisition of Learning Skills	"It inspired us (students) to develop imagination and creativity...We analyzed the case little by little, and it was an exercise for our logical thinking and how to use the learned knowledge." ³³	7,31-33,35,38,39,42,43,45,47-55
	Assessment Orientated	"We (students) want to end the case and get all the answers quickly and maybe we are also more obsessed with the official version of everything. Like, we want the official answer." ^{21(p.743)}	6,7,21,46,50,39,55-57
	Working with others	"I loved PBL... I really enjoyed PBL... I had some really good people in my group. I learnt more in PBL with those students than I did probably in lectures." ^{58(p.4)} "I'm quite motivated and in my team, all of them have their own strengths and weaknesses. Therefore, we compete with each other in a healthy way. That motivates me to be the best. I believe the rest feel that too." ^{49(p.766)}	6,7,31,33,41,43,46,48,49,51,53,54,57,58
Teachers' experience of PBL	Knowledge of Subject Matter	"We, as [tutors], think that we should know everything. But, when we don't have a thorough knowledge of the topic being discussed by the students during the PBL session, we feel uneasy." ⁶	6,34,39,59
	Facilitation Skills	"It is all about the facilitator." "It [students knowing learning objectives/problems beforehand] will not affect the quality of the discussion as long as the facilitator can direct the discussion." ^{60(p. 3)} "Tutors need to be more involved/ interactive. It requires higher level of tutor skills." ⁵¹	6,7,21,31-34,39-41,45,48,49,51,54,56,58-63
	Personal Characteristics	"Our tutor is humorous, can get along with us (students) and respect our opinion. These characteristics give us the courage to share our opinion freely with our fellow students without the fear of ridicule." ^{64(p.182)}	49,53,59,63,64
Student- teacher relationship	Student vs Teacher centered	"The main discussion should be led by the students themselves, and then the students could arrange some activities around certain topics. If the discussion misses the point, or there is a big mistake in the direction, the tutors should correct the students." ³³ "If we [tutors] don't evaluate students' participation in discussions, they [students] won't participate in the discussions at all." ⁶ "We (Students) learn more in lectures because everything is explained by the teacher." ^{31(p.1336)}	6,7,21,31,33-36,39,42,49-51,53,62,65
	Feedback	"It is great that our tutor has made a detailed record of our tutorial performance and has provided us with the feedback at the end of each tutorial. Don't be too polite and afraid of hurting our feelings. Tell us our deficiencies so that we can improve." ^{64(p.181-182)} "I need feedback on good things because I know my bad performance and this feedback on my good performance is important to stimulate me for the next session." ^{31(p.1337)}	6,31,39,46,57,64
	Fear of confrontation	"Tutors should create a good learning environment of us (students) in the first place so that discussion can happen. Sometimes I don't know whether I can talk because I am not sure about the tutors' attitudes." ^{35(p.7)} "In our culture, it's hard to point out wrong-doing to females by male facilitators." ^{46(p.463)}	35,36,46
Course structure and organization	Utilisation of authentic/ realistic cases	"The problem was related to a clinical problem; so that it strongly stimulate[d] an integrated discussion." ^{66(p. 36)}	7,34,37-39,47,49,50,54,55,65,66
	Knowledge level of students	"I think my knowledge in basic sciences is not enough, what I mean is that the foundation is not solid in terms of breadth and depth." ^{50(p.288)}	32,38,39,42,50,51,60
	English as language of instruction (affecting student participation)	"Our tutor is very knowledgeable about English usage, who has corrected our pronunciation and explained to us the meaning and proper usage of technical terminology." ^{64(p.181)} "I really understand, but I just can't communicate using the good language to speak to my friends. It is quite emotion for me, between myself, for the communication." ^{49(p. 769)}	32,36,45,49,64
	Interactive learning material	"Real exposure to clinical signs and symptoms helped us analyze and relate basic concepts to clinical presentation... it caught my attention... going beyond paper and books add[ed] resources that we could use later... Visual material provided an interactive environment." ^{37(p.6)}	37,39,44,63,67

was ineffective for exam preparation. They generally wanted to "end the case and get all the answers quickly."^{21 (p.743)} With preconceptions that knowledge was best assimilated through a teacher-centered approach, some students were not motivated to engage

in student-centered learning approaches and wanted "everything [to be] explained by the teacher."^{31 (p.1336)} Although the goal of PBL was to empower students to develop problem-solving and clinical reasoning skills through knowledge acquisition, many students

remained keen on gaining knowledge through learning methods that they were more familiar with, including memorization.

On the other hand, other students “really enjoyed PBL.”⁵⁸ (p.4) They “felt inspired to develop imagination and creativity”³³ and were “motivated to be the best.”⁴⁹ (p.767) Some students also appreciated working in teams and learning each other’s strengths and weaknesses.⁴⁹ They understood the aim of PBL as a learning method to “practice [their] logical thinking and how to use the learned knowledge.”³³

Teachers’ experiences of PBL

The second-order construct about teachers’ experiences of PBL included teachers’ knowledge of the subject content, facilitation skills, and personal characteristics (Table 3).

In PBL, the contact time between teachers and students was much greater than in a traditional didactic curriculum. However, the teachers were no longer directly imparting knowledge. Instead, they were facilitating discussions to “scaffold student thinking”³³ and “teaching [students] how to fish rather than giving [students] the fish.”³³ Nonetheless, some teachers were unfamiliar with a different teaching method as they were too “used to delivering knowledge to students.”⁶ Without adequate training, some teachers resorted to “not opening [their] mouths.”³⁴

On the one hand, teachers considered it important to supplement core content with “relevant clinical data” and knowledge during PBL.⁶⁴ (p.181) Therefore, some reported feeling incompetent and “uneasy” when they did not have a thorough understanding of the subject matter to differentiate important learning objectives.⁶ On the other hand, some felt it was acceptable to admit limitations in their knowledge.³⁴ Few teachers embraced the PBL philosophy and considered themselves “the same as students,” and would simultaneously “learn together.”³⁵ (p.5)

Effective PBL implementation is also closely linked to teachers’ personalities and qualities. Some teachers skillfully used humor to dissolve conflicts, whilst others used positive reinforcement to encourage student learning.⁶⁴ Other than being facilitators, teachers felt it was important to support students through taking up “different roles (coaches, co-workers, and friends)”³⁵ (p.5)

Student-teacher relationship

The interplay between students and teachers is another second-order construct (Table 3) contributing to both students’ and teachers’ PBL experiences. This included

themes relating to interchange between student-centered and teacher-centered learning, the importance of feedback provision, and fear of confrontation.

To implement PBL, a significant overhaul in the conventional education system is needed to shift from a teacher-centered approach to a student-centered approach. Many intuitions have implemented modifications to improve both students’ and teachers’ PBL experiences. For example, some institutions continued some forms of teacher-centered approaches such as lectures to ensure that students “learned the basic information to participate in PBL.”³¹ (p.1336) Students appreciated the lectures and felt much more confident to ask questions and interact with the facilitators in their PBL sessions afterwards.³¹

Students valued “observant” teachers, who made detailed records of individual strengths and weaknesses during tutorials and provided them with one-on-one feedback.⁶⁴ (p.182) They expressed disappointment when their teachers stayed “aloof” during “out of control” situations.⁶⁴ (p.181) Students recognized the need for feedback to adapt to this new learning style, yet felt that some teachers “[do] not tell [them] anything.”³¹ (p.1337)

Some teachers stated that they are forgiving and considerate when providing feedback in order “not to embarrass students.”⁴⁶ (p.463) Some male facilitators felt it was culturally inappropriate “to point out wrongdoing to females,” which made giving constructive feedback challenging.⁴⁶ (p.463) Meanwhile, students also “found it hard to voice [their] opinion in front of a [teacher]” as they considered their teachers to be authoritative figures and avoided confrontation with them.⁶

Course structure and organization

The second-order constructs relating to course structure and organization are illustrated in Table 3. Firstly, it was considered important that authentic PBL case scenarios were developed to reflect local, and population needs. For students, they appreciated having real clinical cases that they may see in hospitals to “stimulate an integrated discussion”⁶⁶ (p.36) and to motivate them “to search for resources and learn.”⁶⁸ (p.4)

Secondly, it was recognized that PBL content should match students’ knowledge levels and language standards. For instance, when students’ “foundations [were] not solid in terms of breadth and depth,”⁵⁰ (p.288) they struggled to devise learning objectives and participate in discussions.⁶⁰ Therefore, providing a “whole class lecture” prior to small group discussions was an alternative to ensure “enough knowledge.”⁵¹

The English language was not the national language in most of the non-Western countries, nor the primary language for many students, but it was used in majority of medical schools included in this review. Some students found it difficult to read in English and found “searching [on] PubMed painful” and therefore resorted to “Ichushi” (a Japanese database) for information gathering.³⁶ (p. E53) Students also found it difficult to converse in English, and one stated, “I really understand, but I just can’t communicate.”⁴⁹ (p. 769) Nonetheless, teachers were thought to play a major role in furthering students’ English level by “correct[ing] pronunciation and explain[ing] the meaning and proper usage of technical terminology.”⁶⁴ (p.181)

Lastly, it was suggested that PBL should be supplemented with learning materials and resources that provide an interactive platform to stimulate discussions. For example, handouts and end of module quizzes were found to consolidate concepts and increase knowledge retention.³⁷ Going beyond the classroom and providing students with clinical presentations on the wards also enabled students to appreciate the clinical relevance of PBL cases.³⁷

Third-order constructs

Second-order constructs were further developed into third-order constructs that provide an overarching explanation of factors that shape students’ and teachers’ PBL experiences in non-Western countries. Using Noblit and Hare’s line of argument synthesis,²⁹ we derived a schematic diagram (Figure 2) that brought together the three third-order constructs: *Student Engagement*, *Tutor Skills*, and *Organization and Planning*, and demonstrate the significant overlap amongst these constructs.

Western education was based on the concept that knowledge should be continuously questioned with a critical mind, and PBL specifically required knowledge development to be grounded in discussion and debate. As non-Western students’ learning styles and attitudes were not always aligned with PBL educational values, their engagement was constantly compromised.⁶⁹ For instance, Asian education, as influenced by Confucianism, expected students not to be outspoken, contributing to their low levels of participation in group discussions.¹⁶ Additionally, this may be caused by conventional teaching methodologies and learning habits, where students were comfortable with acquiring knowledge from didactic approaches without challenging them.³⁶ Having been driven by an exam-orientated academic culture throughout their early education, students were also compelled to

obtain the correct answers as quickly as possible for examination purposes with minimal engagement.

In PBL, teachers were required to deconstruct their traditional roles and adopt multi-dimensional ones, but many were not used to breaking down such barriers and building meaningful relationships. It was particularly challenging for those living in societies characterized by intrinsic hierarchical structures and those who have not witnessed such approaches in their own education backgrounds. This was highlighted under the third-order construct—*Tutor Skills*.

Different *Organization and Planning* processes were needed when implementing and sustaining PBL systems in non-Western countries. It was a resource-intensive process requiring considerable financial, logistical, and technological support. This could be even more challenging for medical schools that already face significant material and human resource shortages. An oft-cited example of this in this review was that of internet access and connection stability for students to prepare for PBL.

As highlighted in Figure 2, there was overlap of second-order constructs amongst the third-order constructs. Firstly, the overlap between *Student Engagement* and *Tutor Skills* highlighted the interpersonal relationships between students and teachers. Previously dependent on teachers for learning needs, students remained deferential toward teachers as authority figures, and fearful of challenging the hierarchy. When teachers were unfamiliar with students’ learning needs and progresses, they similarly contributed to the large power distance and disengaged with their facilitative roles. Creating a mechanism to provide feedback would break down barriers and develop greater understanding of each other’s roles. Secondly, the overlap between *Tutor Skills* and *Organization and Planning* demonstrated that PBL does not abandon all forms of authority. Instead, it highlighted the difference between instructing and facilitating to generate a cooperative learning atmosphere for PBL. Lastly, the overlap between *Student Engagement* and *Organization and Planning* demonstrated the importance of establishing a curriculum that corresponded to students’ existing knowledge levels to promote student participation. Although English was used as the language of instruction in many non-Western countries, it should not be the main factor hindering students’ learning experience and subject competence.

At the “heart” of the model pulling the third-order constructs together was *Pedagogical Philosophy*. This was the fundamental consideration when adopting a Western approach in a non-Western country. The compatibility of the Western epistemological

principles and practices that underpin PBL with the local context was a clear overarching factor that captured the key thrust of the *third-order constructs* identified in this review.

Discussion

Summary

This synthesis of studies examining PBL implementation in non-Western countries demonstrates that students' and teachers' experiences can be broadly described according to three groupings: *Student Engagement, Tutor Skills, Organization, and Planning* (Figure 2). Students' and teachers' PBL experiences are dependent on each other's commitment to the approach and the level of institutional support. Both students and teachers may benefit from additional training to facilitate their transition to PBL, particularly focusing on understanding its philosophical underpinnings.

Some of the challenges faced by non-Western students and teachers are similar to those encountered by their counterparts from Western backgrounds too. For example, it is common for students to feel "lost" with poor motivation and engagement at the start of PBL implementation.^{10,70} Similarly, for Western teachers, they may struggle initially with their "new" roles as facilitators.^{12,13}

Strengths and limitations

This review used a systematic strategy to identify studies from multiple databases and included papers from across 18 countries. Independent data extraction and quality appraisal were carried out separately by individual researchers and a sample of abstracts was screened by a different researcher. The use of meta-ethnography allowed the findings to be synthesized in an interpretive way by the review team, which consisted of both medical students and teachers with varied PBL experiences.

Although the review consisted of a wide-geographical range of studies from Asia, the Middle East, Africa, and South America, each of these regions is an area with mosaic of cultures and the included articles cannot be considered wholly representative of these areas. Furthermore, the definition and delivery of PBL are likely to vary according to individual institutions and may be different from the original model developed by Howard Barrows and his colleagues.⁵ Lastly, many other medical schools that have implemented PBL may not have documented their experiences in English or in peer-reviewed journals, but rather in their native language or in less formal publications.

Implications for medical educators

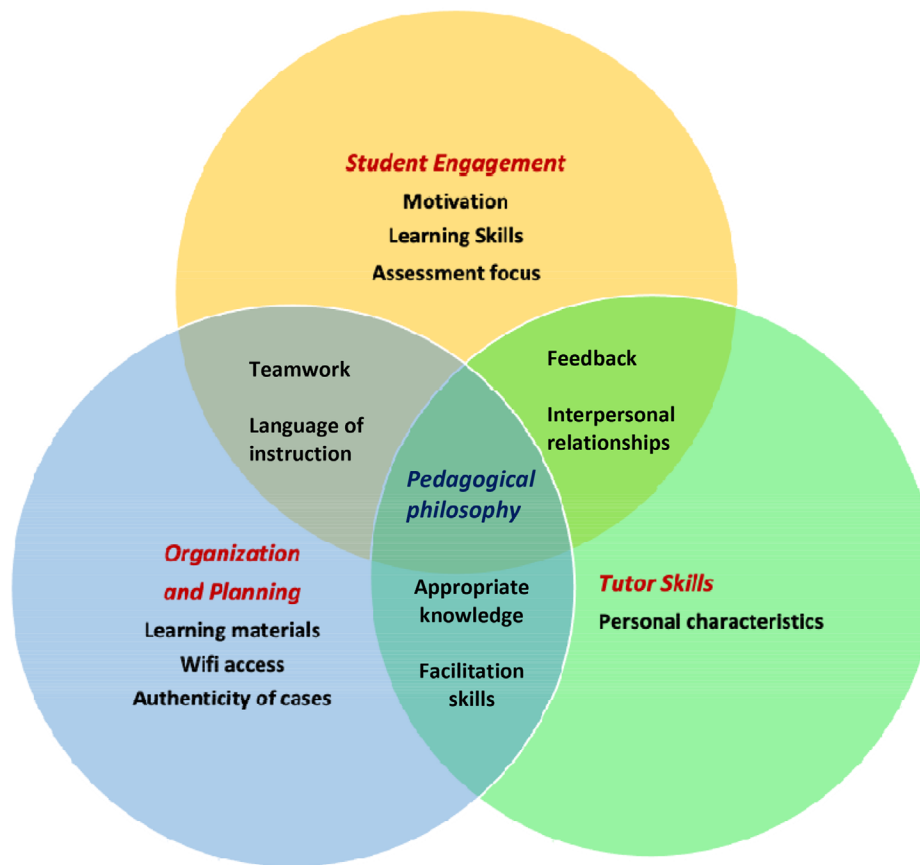
PBL represents a significant paradigm shift for many non-Western educational cultures from a traditional teacher-centered approach to a student-centered learning method. Leaders and policymakers in non-Western medical schools could benefit from considering student-centered learning in a more holistic way prior to introducing a specific approach like PBL. This may include providing students with additional training in communication and problem-solving skills. It may equally be valuable to introduce students to the philosophical underpinnings of PBL and educate them to provide constructive feedback to their peers and teachers. This would not only allow students to develop greater self-awareness, but also enable teachers and institutions to identify emerging problems at early stages and take appropriate remedial actions. For the faculty, training should also focus on understanding the PBL educational philosophy and identifying the most appropriate facilitative model for group learning.

For institutions entrenched in more traditional curricula, the transition to PBL requires rigorous planning. One challenge is to curate an individualized PBL approach that embraces local cultural variations and trains doctors to meet populational needs. Replicating PBL approaches from Western settings is problematic due to educational, cultural, and healthcare differences. Studies in this review made various modifications to PBL approaches, including what is conceptualized as a "hybrid" program that included PBL elements alongside traditional teaching and learning approaches, to help students with different learning styles and preferences.

Since the outcome of this systematic review, the COVID-19 pandemic has significantly changed the mode of medical education teaching globally. Many institutions in both non-Western and Western countries settings have rapidly switched in-person PBL to an online approach to facilitate distance learning, with varying degrees of successes.^{71,72} Despite virtual workspaces enabling real-time discussion, some students and faculty members have found it more challenging due to unstable internet connection and anxiety around technology use.⁷³ Virtual PBL also does not reproduce the same interpersonal distance as physical interaction.⁷¹ Moving forward, medical educators need to understand the impact of virtual learning on both students and tutors and make deliberate decisions on virtual PBL implementation in non-Western settings.

Implications for research

PBL adoption in non-Western settings is one of the many examples of the widespread and ongoing dissemination



Red = Third Order Constructs; Black = Second Order Constructs

Figure 2. Explanatory model of factors affecting the implementation of PBL in non-Western settings. Red=Third Order Constructs; Black=Second Order Constructs

of Western medical education methods. Others include the use of Objective Structured Clinical Examinations (OSCEs) and patient-centered cultural competency curricula.^{74,75} As with PBL explored in this study, understanding educational values and local sociocultural contexts are critical to comprehending the unintended consequences of adopting these practices outside of the settings in which they were developed. Since educational methodologies fundamentally reflect cultural and ideological values, it is crucial to further examine whether medical education around the world necessitates a universalizing “reform.”⁷⁵ Individual institutions need to question the motive behind globalization and the people formulating these proposals, in order to prioritize their students’ learning and their population healthcare needs. These findings are aligned with those Frambach and colleagues who stated that “PBL as a singular and universal concept has no global future” and that “power relations must be considered” when sharing global practices.¹⁴ (p.931)

As the world of medical education globalizes, many medical schools have both domestic students, who may speak unique dialects, as well as international

students from overseas. Given the inseparable link between “Western” and “English-speaking,” further empirical research is needed to examine the impact of using English as the language of instruction in these non-Western medical schools, specifically on how it affects students’ collaborative PBL experience.

Given the “hybridization” of PBL that was used in several studies in this review, further evaluations of such approaches may also be helpful. Finally, in light of the “export” of PBL and other educational approaches from West to East, it may be helpful to analyze how medical educators make decisions regarding adoption and implementation of Western teaching methods. Applying these research avenues with post-colonial theories would elucidate the local and global forces that influence curricula development.

Conclusion

PBL was first introduced in North America many decades ago, and it is still being implemented across the world. With the aim of training students to be

better problem-solvers and communicators, institutions globally are shifting from a traditional teacher-led style to a student-centered learning approach. This study highlights how PBL implementation in a non-Western setting requires institutions to make significant modifications to ensure students engage with PBL methods whilst respecting cultural variations and interests. Medical education leaders and policymakers in non-Western countries should be cognizant of the fact that PBL does not “lift and shift” easily outside of the Western context in which it was developed, and should adjust their adoption strategies accordingly. This may include supporting medical students and teachers to “hybridize” PBL in a way that fits to their local context.

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References

1. Kwan CY, Chan LC, Nicholls JM, Sheng HP, Wong TM, et al. Problem-based learning (PBL) in teaching physiology and pathology. In: Kember D, ed. *Case Studies of Improving Teaching and Learning from the Action Learning Project*. Hong Kong: Hong Kong Polytechnic University; 1997:61–69.
2. Barrows H. The essentials of problem-based learning. *J Dent Educ*. 1998. doi:10.1002/j.0022-0337.1998.62.9.tb03223.x
3. Kaufman DM, Holmes DB. Tutoring in problem-based learning: perceptions of teachers and students. *Med Educ*. 1996; doi:10.1111/j.1365-2923.1996.tb00850.x
4. Barrows HS. Problem-based learning in medicine and beyond: a brief overview. *New Directions Teach Learn*. 1996;1996(68):3–12. Published online doi:10.1002/tl.37219966804
5. Neufeld VR, Woodward CA, MacLeod SM. The McMaster M.D. program: a case study of renewal in medical education. *Academic Med*. 1989;64(8):423–432. Published online. doi:10.1097/00001888-198908000-00001
6. Ju H, Choi I, Rhee BD, Tae-Lee J. Challenges experienced by Korean medical students and tutors during problem-based learning: a cultural perspective. *Interdisciplinary J Problem-Based Learn*. 2016;10(1). doi:10.7771/1541-5015.1565
7. Nanda B, Manjunatha S. Indian medical students' perspectives on problem-based learning experiences in

- the undergraduate curriculum: one size does not fit all. *J Educ Eval Health Prof*. 2013;10:11.
8. Koh GCH, Khoo HE, Wong ML, Koh D. The effects of problem-based learning during medical school on physician competency: a systematic review. *CMAJ*. 2008; doi:10.1503/cmaj.070565
 9. Azer SA, Azer D. Group interaction in problem-based learning tutorials: a systematic review. *Eur J Dent Educ*. 2015;19(4):194–208. doi:10.1111/eje.12121
 10. de Grave WS, Schmidt HG, Boshuizen HPA. Effects of problem-based discussion on studying a subsequent text: a randomized trial among first year medical students. *Instr Sci*. 2001;29(1):33–44. doi:10.1023/A:1026571615672
 11. Kindler P, Grant C, Kulla S, Poole G, Godolphin W. Difficult incidents and tutor interventions in problem-based learning tutorials. *Med Educ*. 2009;43(9):866–873. <https://go.openathens.net/redirector/nhs?url=https%3A%2F%2Fonlinelibrary.wiley.com%2Fdoi%2Ffull%2F10.1111%2Fj.1365-2923.2009.03423.x>
 12. Azer SA. Problem-based learning: challenges, barriers and outcome issues. *Saudi Med J*. 2001.
 13. Ward JD, Lee CL. A review of problem-based learning. *J Family Consumer Sci Educ*. 2002;22(5):389–397.
 14. Frambach JM, Talaat W, Wasenitz S, Martimianakis MA. 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. Published online. doi:10.1007/s10459-019-09930-4
 15. World Federation For Medical Education. *Postgraduate Medical Education WFME Global Standards for Quality Improvement The 2015 Revision*. 2015.
 16. Khoo HE. Implementation of problem-based learning in Asian medical schools and students' perceptions of their experience. *Med Educ*. 2003;37(5):401–409. Published online. doi:10.1046/j.1365-2923.2003.01489.x
 17. Bleakley A, Brice J, Bligh J. Thinking the post-colonial in medical education. *Med Educ*. 2008;42(3):266–270. Published online doi:10.1111/j.1365-2923.2007.02991.x
 18. Hodges BD, Ginsburg S, Cruess R, et al. Assessment of professionalism: Recommendations from the Ottawa 2010 Conference. *Med Teach*. 2011;33(5):354–363. In: doi:10.3109/0142159X.2011.577300
 19. Hodges BD, Maniate JM, Martimianakis MA, Alsuwaidan M, Segouin C. Cracks and crevices: globalization discourse and medical education. *Med Teach*. 2009;31(10):910–917. doi:10.3109/01421590802534932
 20. Stearns PN. *Western Civilization in World History*. 2003. doi:10.4324/9780203930090
 21. Frambach JM, Driessen EW, Chan LC, van der Vleuten CPM. Rethinking the globalisation of problem-based learning: how culture challenges self-directed learning. *Med Educ*. 2012;46(8):738–747. <https://go.openathens.net/redirector/nhs?url=https%3A%2F%2Fonlinelibrary.wiley.com%2Fdoi%2Ffull%2F10.1111%2Fj.1365-2923.2012.04290.x> doi:10.1111/j.1365-2923.2012.04290.x
 22. Yin Q, Guo C, Dong C, Wang T. May problem-based learning get higher evaluation from student? *IJCS*. 2021;5(1):92–111. Published online doi:10.1108/IJCS-12-2020-0019

23. Britten N, Campbell R, Pope C, Donovan J, Morgan M, Pill R. Using meta ethnography to synthesis qualitative research. *J Health Serv Res Policy*. 2002;7(4):209–215. Published online. doi:[10.1258/135581902320432732](https://doi.org/10.1258/135581902320432732)
24. Greenhalgh T, Peacock R. Effectiveness and efficiency of search methods in systematic reviews of complex evidence: audit of primary sources. *Br Med J*. 2005;331(7524):1064–1065. Published online. doi:[10.1136/bmj.38636.593461.68](https://doi.org/10.1136/bmj.38636.593461.68)
25. Felizardo KR, Mendes E, Kalinowski M, Souza ÉF, Vijaykumar NL. Using forward snowballing to update systematic reviews in software engineering. In: International symposium on empirical software engineering and measurement; 2016. doi:[10.1145/2961111.2962630](https://doi.org/10.1145/2961111.2962630)
26. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *PLoS Med*. 2009;6(7):e1000100. Published online doi:[10.1371/journal.pmed.1000100](https://doi.org/10.1371/journal.pmed.1000100)
27. Critical Appraisal Skills Programme. CASP qualitative checklist. CASP. 2018.
28. Dixon-Woods M, Sutton A, Shaw R, et al. Appraising qualitative research for inclusion in systematic reviews: a quantitative and qualitative comparison of three methods. *J Health Serv Res Policy*. 2007;12(1):42–47. Published online doi:[10.1258/135581907779497486](https://doi.org/10.1258/135581907779497486)
29. Noblit GW, Hare RD. Meta-ethnography: Synthesizing Qualitative Studies (Qualitative Research Methods). 1988.
30. Berger R. Now I see it, now I don't: researcher's position and reflexivity in qualitative research. *Qualitative Research*. 2015;15(2):219–234. doi:[10.1177/1468794112468475](https://doi.org/10.1177/1468794112468475)
31. Khan IA, Al-Swailmi FK. Perceptions of faculty and students regarding problem based learning: a mixed methods study. *J Pak Med Assoc*. 2015;65(12):1334–1338.
32. Singaram VS, van der Vleuten CPM, Stevens F, Dolmans DHJM. For most of us Africans, We don't just speak": a qualitative investigation into collaborative heterogeneous PBL group learning. *Adv Health Sci Educ Theory Pract*. 2011;16(3):297–310. doi:[10.1007/s10459-010-9262-3](https://doi.org/10.1007/s10459-010-9262-3)
33. Wang Q, Li H, Pang W. From PBL tutoring to PBL coaching in undergraduate medical education: an interpretative phenomenological analysis study. *Med Educ Online*. 2016;21(1):31973. doi:[10.3402/meo.v21.31973](https://doi.org/10.3402/meo.v21.31973)
34. Servant VFC, Dewar EFA. Investigating problem-based learning tutorship in medical and engineering programs in Malaysia. *Interdisciplinary J Problem-Based Learn*. 2015;9(2). doi:[10.7771/1541-5015.1442](https://doi.org/10.7771/1541-5015.1442)
35. Wang Q, Li H, Pang W, Liang S, Su Y. Developing an integrated framework of problem-based learning and coaching psychology for medical education: a participatory research. *BMC Med Educ*. 2016;16:2. <http://www.biomedcentral.com/1472-6920/16/2> doi:[10.1186/s12909-015-0516-x](https://doi.org/10.1186/s12909-015-0516-x)
36. Iwata K, Doi A. Can hybrid educational activities of team and problem based learning program be effective for Japanese medical students? *Kobe J Med Sci*. 2017;63(2):E51–E57. <https://www.ncbi.nlm.nih.gov/pubmed/29434175>
37. Fatima SS, Ghias K, Jabeen K, Sabzwari S. Enhancing cognitive engagement of pre-clinical undergraduate medical students via video cases and interactive quizzes in problem-based learning. *Cureus*. 2019;11(1):e3832. doi:[10.7759/cureus.3832](https://doi.org/10.7759/cureus.3832)
38. Si J. An analysis of medical students' reflective essays in problem-based learning. *Korean J Med Educ*. 2018;30(1):57–64. doi:[10.3946/kjme.2018.82](https://doi.org/10.3946/kjme.2018.82)
39. Wahid M, Kumara A, Prihatiningsih TS, Rahayu GR, Mustika R, Felaza E. Students' perceptions on problem-based learning implementation: a case study at an Indonesian medical school. *醫學教育*. 2014;18(4):171–183.
40. Kim KJ, Kee C. Evaluation of an e-PBL model to promote individual reasoning. *Med Teach*. 2013;35(3):e978–e983. doi:[10.3109/0142159X.2012.717185](https://doi.org/10.3109/0142159X.2012.717185)
41. Lajoie SP, Hmelo-Silver C, Wiseman J, et al. Using online digital tools and video to support international problem-based learning. *Interdisciplinary J Problem-Based Learn*. 2014;8(2):60–75. doi:[10.7771/1541-5015.1412](https://doi.org/10.7771/1541-5015.1412)
42. Shankar PR, Balasubramanium R, Dwivedi NR, Nuguri V. Student feedback about the integrated curriculum in a Caribbean medical school. *J Educ Eval Health Prof*. 2014;11:23. doi:[10.3352/jeehp.2014.11.23](https://doi.org/10.3352/jeehp.2014.11.23)
43. Aziz A, Iqbal S, Zaman AU. Problem based learning and its implementation: faculty and student's perception. *J Ayub Med Coll Abbottabad*. 2014;26(4):496–500.
44. Elzubeir MA. Teaching of the renal system in an integrated, problem-based curriculum. *Saudi J Kidney Dis Transpl*. 2012;23(1):93–98. <https://www.ncbi.nlm.nih.gov/pubmed/22237226>
45. Garí Calzada MA, Iputo JE. Student opinions on factors influencing tutorials at Walter Sisulu University, South Africa. *MEDICC Rev*. 2015;17(3):13–17.
46. Qadan L, Al-Ozairi E, Ayed A, Huang G. Avoiding honest feedback: discordance between formal evaluations and candid assessments of Kuwaiti PBL students. *Med Teach*. 2013;35(6):459–464. doi:[10.3109/0142159X.2013.774337](https://doi.org/10.3109/0142159X.2013.774337)
47. Roche M, Adiga IK, Nayak AG. PBL trigger design by medical students: an effective active learning strategy outside the classroom. *J Clin Diagn Res*. 2016;10(12):JC06–JC08. doi:[10.7860/JCDR/2016/21813.9015](https://doi.org/10.7860/JCDR/2016/21813.9015)
48. Wahid MH, Prihatiningsih TS, Rahayu GR, Mustika R, Felaza E. The tutorial process in problem based learning and its related factors: a qualitative study. *J Med*. 2018;22(3):98–106.
49. Hussain RMR, Mamat WHW, Salleh N, Saat RM, Harland T. Problem-based learning in Asian universities. *Studies Higher Educ*. 2007;32(6):761–772. Published online doi:[10.1080/03075070701685171](https://doi.org/10.1080/03075070701685171)
50. Tsou KI, Cho SL, Lin CS, et al. Short-term outcomes of a near-full PBL curriculum in a new Taiwan medical school. *Kaohsiung J Med Sci*. 2009;25(5):282–293. [https://go.openathens.net/redirector/nhs?url=https%3A%2F%2Fwww.clinicalkey.com%2F-content%2FplayBy%2Fdoi%2F%3Fv%3D10.1016%2FS1607-551X\(09\)70075-0](https://go.openathens.net/redirector/nhs?url=https%3A%2F%2Fwww.clinicalkey.com%2F-content%2FplayBy%2Fdoi%2F%3Fv%3D10.1016%2FS1607-551X(09)70075-0) doi:[10.1016/S1607-551X\(09\)70075-0](https://doi.org/10.1016/S1607-551X(09)70075-0)
51. Johnston JM, Schooling CM, Leung GM. A randomised-controlled trial of two educational modes for undergraduate evidence-based medicine learning in Asia. *BMC Med Educ*. 2009;9:63. doi:[10.1186/1472-6920-9-63](https://doi.org/10.1186/1472-6920-9-63)

52. Leatemia LD, Susilo AP, van Berkel H. Self-directed learning readiness of Asian students: students perspective on a hybrid problem based learning curriculum. *Int J Med Educ*. 2016;7:385–392. doi:10.5116/ijme.582e.021b
53. Lee GH, Lin CS, Lin YH. How experienced tutors facilitate tutorial dynamics in PBL groups. *Med Teach*. 2013;35(2):e935–e942. doi:10.3109/0142159X.2012.714883
54. Sulaiman N, Hamdy H. Problem-based learning: Where are we now? Guide supplement 36.3–Practical Application. *Med Teach*. 2013;35(2):160–162. doi:10.3109/0142159X.2012.737965
55. Joseph N, Jain A, Kotian SM. Faculty perception towards a “hybrid” problem based learning methodology. *JCDR*. 2016; doi:10.7860/JCDR/2016/21910.8872
56. Phenwan T, Tawanwongsri W. Challenges in problem-based learning and suggested solutions at the school of medicine, Walailak University: a mixed-methods study. *Ramathibodi Med J*. 2018;41(2):1–8.
57. Bollela VR, Gabarra MHC, da Costa C, Lima RCP. Students and tutors’ social representations of assessment in problem-based learning tutorials supporting change. *BMC Med Educ*. 2009;9:30. doi:10.1186/1472-6920-9-30
58. Green-Thompson LP, McInerney P, Manning DM, Mapukata-Sondzaba N, Chipamaunga S, Maswanganyi T. Reflections of students graduating from a transforming medical curriculum in South Africa: a qualitative study. *BMC Med Educ*. 2012;12:49. doi:10.1186/1472-6920-12-49
59. Kassab S, Al-Shboul Q, Abu-Hijleh M, Hamdy H. Teaching styles of tutors in a problem-based curriculum: students’ and tutors’ perception. *Med Teach*. 2006;28(5):460–464. doi:10.1080/01421590600627540
60. Abdalla ME, Eladl MA. Student perception of the effect of problem familiarity on group discussion quality in a problem-based learning environment. *GMS J Med Educ*. 2019;36(3):Doc29. doi:10.3205/zma001237
61. Mubuuke AG, Louw AJN, van Schalkwyk S. Utilizing students’ experiences and opinions of feedback during problem based learning tutorials to develop a facilitator feedback guide: an exploratory qualitative study. *BMC Med Educ*. 2016;16:6. doi:10.1186/s12909-015-0507-y
62. Yeo S, Chang BH. Students’ perceptions and satisfaction level of hybrid problem-based learning for 16 years in Kyungpook National University School of Medicine, Korea. *Korean J Med Educ*. 2016;28(1):9–16. doi:10.3946/kjme.2016.4
63. Das M, Mpofu DJS, Hasan MY, Stewart TS. Student perceptions of tutor skills in problem-based learning tutorials. *Med Educ*. 2002;36(3):272–278. doi:10.1046/j.1365-2923.2002.01148.x
64. Lin CS. Medical students’ perception of good PBL Tutors in Taiwan. *Teach Learn Med*. 2005;17(2):179–183. doi:10.1207/s15328015tlm1702_13
65. Hassan S. Knowledge acquisition in biochemistry, physiology and anatomy within the context of problem-based learning. *Africa Education Review*. 2013;10(1):48–64. doi:10.1080/18146627.2013.786866
66. Shitarukmi S, Projosasmito SR, Roebertsen H. The effectiveness of PBL problems from students and tutors perspectives. *JPKI*. 2017;6(1):31–43. doi:10.22146/jpki.25364
67. Arain SA, Afsar NA, Rohra DK, Zafar M. Learning clinical skills through audiovisual aids embedded in electronic-PBL sessions in undergraduate medical curriculum: perception and performance. *Adv Physiol Educ*. 2019;43(3):378–382. doi:10.1152/advan.00075.2019
68. Lisiswanti R. Student’s perception about problem-based learning curriculum faculty of medicine Universitas Lampung. In: *Jakarta Meeting on Medical Education*. Indonesia: Fakultas Kedokteran Universitas;2017.
69. Kennedy P. Learning cultures and learning styles: myth-understandings about adult (Hong Kong) Chinese learners. *Intern J Lifelong Educ*. 2002;21(5):430–445. Published online doi:10.1080/02601370210156745
70. Walker A, Bridges E, Chan B. Wisdom gained, wisdom given: instituting PBL in a Chinese culture. *J Educ Admin*. 1996;34(5):12–31. Published online doi:10.1108/09578239610148250
71. Foo CC, Cheung B, Chu KM. A comparative study regarding distance learning and the conventional face-to-face approach conducted problem-based learning tutorial during the COVID-19 pandemic. *BMC Med Educ*. 2021;21(1):1–6. doi:10.1186/s12909-021-02575-1
72. Binks AP, LeClair RJ, Willey JM, et al. Changing medical education, overnight: the curricular response to COVID-19 of nine medical schools. *Teach Learn Med*. 2021;33(3):334–342. doi:10.1080/10401334.2021.1891543
73. Hashim H, School of Pharmacy, International Medical University (IMU), Kuala Lumpur, MALAYSIA, Chong DWK, Er HM, et al. Students’ perceptions of live online virtual e-problem based learning (LOVE-PBL) using Google hangouts. *EIMJ*. 2017;9(4):31–39. doi:10.21315/eimj2017.9.4.4
74. de Almeida Troncon LE. Clinical skills assessment: limitations to the introduction of an “OSCE” (objective structured clinical examination) in a traditional Brazilian medical school. *Sao Paulo Med J*. 2004;122(1):12–17. Published online doi:10.1590/S1516-31802004000100004
75. Elliott J, Grigorenko E. Are western educational theories and practices truly universal? *Comp Educ*. 2007;43(1):1–4. Published online doi:10.1080/03050060601160929