

ARTICLE

## Common Pedagogical Shortcomings of Instructors in a Problem-Based Learning (PBL) Environment

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## ABSTRACT

This study was conducted in an institution of higher learning where the predominant instructional approach is problem-based learning (PBL). The institution conducts a certification exercise to develop instructors' competencies, based on seven dimensions of effective teaching and learning. Data from the certification exercise and training records of 67 candidates who attempted but did not attain the certification were analysed. The results showed that the lowest-scoring dimension was "facilitation and scaffolding", and the most commonly observed shortcoming that hindered effective "facilitation and scaffolding" was candidates' inability to ask effective questions and their tendency to lead in students' learning. The results also showed that candidates completed very few or no optional training programmes related to teaching and learning prior to their certification attempts. This study provides new opportunities in both policy and practices to support faculty development, such as setting up of formalised institution-wide framework, and providing regular training needs analysis and targeted training programmes.

**Keywords:** Facilitation, problem-based learning, social constructivist, classroom learning, scaffolding

## INTRODUCTION

In the context of social constructivism, a classroom is viewed as a learned community whereby meaningful learning occurs through the pursuit of authentic tasks and collaboration between peers and teachers (Azzarito & Ennis, 2003). In a problem-based learning (PBL) classroom, instructors act as facilitators to help students make use of their prior knowledge and experiences to develop critical thinking, problem solving, and collaborative skills as the students work together to explore and derive the optimal solution for an "ill-structured problem" (Hmelo-Silver, 2004; Schmidt, 1993; Barrows, 1988).

The quality of experience in a PBL environment typically hinges on a confluence of three factors, namely (i) the skill of the facilitator, (ii) the quality of the problem, and (iii) the participants themselves—prior knowledge and collaborative attitude being amongst the other desired attributes. Much has been written about the nature and quality of problems used in a PBL environment (Hmelo-Silver, 2013; Hung, 2009). Kapur and Kinzer (2007) asserted that the attainment of learning outcomes in a PBL lesson is dependent on both the "ill-structuredness" of the problem and a good facilitator. However, enabling good problems and its delivery is insufficient. The facilitator's role is critical to ensuring the PBL exercise functions well and in guiding the students' inquiry process (Hmelo-Silver, 2004). It is therefore important to strengthen the interaction between instructors and students in a PBL environment. To do this, one needs to study the factors which influence instructors' facilitation skills and what constitutes effective facilitation.

## LITERATURE REVIEW

The problem-based classroom requires instructors to adopt a student-centred learning approach. Instructors who were used to or have been educated in a teacher-led environment would need to learn new skills, which included having to make important shifts in their teaching behaviour and being willing to re-examine their beliefs and values about issues such as control, conformity and student–instructor relationships (Katz, 1995; Jung et al., 2005).

In the context of student education in institutions of higher learning, effective questioning techniques of instructors and timeliness of instructor feedback have been commonly identified as characteristics of good PBL facilitation (Goh, 2014; Ling & Loy, 2007). In fact, skilled facilitators have been recognised as being central to the success of PBL, apart from the other facets associated with the adoption of PBL (Salinitri et al., 2015).

However, there are limited studies that examine the factors that deter effective facilitation in a PBL classroom, and the interventions that institutions can initiate to improve instructors' facilitation. The level of self-confidence of instructors in their own facilitation skills, and the level of confidence instructors have regarding their students' ability to self-direct their learning had been identified as factors which affect the behaviour and interventions of instructors in the PBL classroom (Assen et al., 2016). Ertmer and Simons' (2006) review of the literature identified three challenges that instructors may face in implementing PBL: (i) creating a culture of collaboration and interdependence; (ii) adjusting to changing roles; and (iii) scaffolding students' learning and performance. Nariman and Chrispeels (2016) found that while instructors welcomed the idea of PBL and were committed to experimenting with how to shift their teaching—from a scripted curriculum to one where students were engaged in PBL—further studies need to be conducted on how to help instructors make this shift.

Leow et al. (2017) sought to complement the findings on what constitutes good PBL facilitation with their study on barriers to effective facilitation. They analysed data collated from 25 instructors who participated in an in-house certification exercise in 2015 but did not attain the certification, and they found that in cases where

facilitation had not been effective, it was not due to an absence of good practices but a poor understanding of the basic tenets of good facilitation. This insight prompted the present study to build upon the preliminary findings by Leow et al. (2017). The study seeks to find out the common pedagogical shortcomings demonstrated by a larger group of instructors, as compared to that by Leow et al. (2017), in the PBL classroom.

Evaluation of instructors that is benchmarked against a common philosophy and aligned with institutional goals (Biggs, 2001) has been recognised as an educationally sound approach that shifts focus from the individual teacher towards the evaluation of teaching in its wider context, which helps enhance the quality of students' learning (Cannon, 2001). The evaluation results of instructors may be used by the institution to target professional growth opportunities for instructors, particularly for instructors who are not meeting expectations in terms of their classroom performance. In this light, the instructor evaluation may be used to support dual goals—evaluation for accountability by the instructors, and evaluation for professional development (Goe et al., 2012). Within the institution in which the study was conducted, a certification exercise was developed to evaluate instructors' teaching, and this was launched and instituted since the establishment of the institution over a decade ago. There has been however little investigation of the effectiveness of instructors' PBL facilitation or the training programmes that prepare instructors for facilitation, of which this study seeks to gain insights from data collated from the certification exercise.

The research questions for this study were as follows:

- What are the common pedagogical shortcomings demonstrated by instructors in a PBL classroom?
- From the shortcomings highlighted, what are the interventions that could be recommended to support the instructors?

## **METHODS**

### ***Education context***

This study was conducted in an institution of higher learning located in Singapore that adopts a social constructivist approach in its teaching and learning. The predominant instructional approach used is PBL. Ethical approval was granted by the institution's Ethics Review Committee to conduct this study.

As part of the institution's practice, instructors who join as faculty participate in a certification exercise as part of their contractual obligation before they are offered an open contract. The certification exercise provides a platform for candidates to discuss their teaching strategies and receive feedback regarding their competencies to facilitate a PBL classroom.

### ***Certification exercise***

The institution has an in-house training department that provides development courses and consultancy to help faculty prepare for the certification exercise, which was developed since the establishment of the institution. Candidates are evaluated and benchmarked against a common set of competencies aligned to the institutional philosophy. Seven dimensions of effective teaching and learning are identified by the institution and used in faculty development as well as in the certification rubric. These seven dimensions are: (i) the creation of a conducive learning environment; (ii) the activation of prior knowledge and the acquisition of new knowledge and skills; (iii) effective facilitation and scaffolding of learning; (iv) the infusion of collaborative learning; (v) the use of self-directed learning to internalise learning and foster metacognition; (vi) promoting self-reflection; and, (vii) assessing meaningfully and authentically. Together, they form a framework known as the Principles of Effective Teaching and Learning.

The certification panel comprises 39 appointed faculty members who have themselves attained the certification and were identified by their peers as good exemplars. They are also often called upon to be peer coaches based on their experience and expertise. Leading up to every certification exercise, panel members attend calibration exercises, conducted by the training department, to align expectations and the certification standard. The pool of panel members rotate amongst themselves in conducting the certification interviews. Each certification interview is conducted by a panel of three members.

Candidates attempting the certification exercise are invited to attend a set of training programmes designed to enhance their skills and competences in facilitating a PBL classroom. These programmes comprise at least 84 hours of training encompassing the seven dimensions of effective teaching and learning, as well as other domains such as pastoral care and career guidance. Beyond these prescribed training programmes, there are also other optional in-house training programmes made available to them. The candidates may also receive varying degrees of peer coaching support from their respective departments during their preparations for the certification exercise. While all departments have a recognised group of peer coaches and are encouraged to provide peer coaching support to staff attempting the certification exercise, there is no formalised structure to the peer coaching programme across the institution.

Besides attending the compulsory training programmes, candidates attempting the certification exercise are also invited to submit a teaching portfolio, a video recording of a lesson and finally, to attend an interview with the certification panel comprising three interviewers. Table 1 summarises the certification process undertaken by the candidate. There were three significant stages to the certification process—before, during and after the interview with the certification panel.

Table 1  
*Summary of certification process undertaken by the candidate*

<b>Stages of Certification Process</b>	<b>Candidate's Actions</b>
1 Before Interview	<ul style="list-style-type: none"> <li>- Attend training programmes</li> <li>- May receive peer-coaching support</li> <li>- Submit portfolio and video-recording of a lesson</li> </ul>
2 During Interview	Engage in conversation with panel comprising three faculty members
3 After Interview	Receive certification outcome with developmental feedback, based on institution's seven dimensions of effective teaching and learning

Portfolios serve as authentic assessments with focus on the content, strategy and sequences of action delivered by instructors in the classroom and helps to provide feedback to candidates to plan for further instruction (Xu, 2004). The portfolio submitted by the candidates would include reflections on practice with reference to the institution's philosophy, data on student learning and students' feedback on the instructor. The portfolio also contains information on the training programmes the instructors have attended prior to the certification exercise. The video recordings provide opportunities for candidates to examine student engagement (Shepherd & Hannafin, 2008) as well as self-evaluate and reflect on their classroom performance and teaching processes (Baecher et al., 2013; Kong et al., 2009). The video recording would also capture the classroom interaction between the instructor and students for the entire lesson. A typical session lasts for at least four hours. This comprises a problem definition and clarification phase of learning, followed by a period of collaborative learning and independent student research before concluding with a segment for students' solutions to be

presented. Panel members are given access to the video recording prior to the interview, and they can make use of segments of the portfolio and video recording to initiate discussions with the candidate during the interview.

Based on evidence of the candidate’s lesson facilitation as captured in the video, as well as the quality of the submitted teaching portfolio, the panel will do an evaluation following the interview for each dimension, and a score of either “1”, “2”, or “3” would be awarded to the dimension. The performance indicators and scores are shown in Table 2.

Table 2  
*Performance indicator for respective scores*

Score	Performance Indicators
1	Emerging–Able to anticipate students' learning needs but may not be able to intervene or strategise ways to support them appropriately. Intentions may not correlate with actions, or actions may not help students achieve certain learning behaviours.
2	Competent–Able to anticipate students' learning needs and is able to intervene or strategise ways to support them appropriately. May not always be cognisant of the impact of an action on learning.
3	Proficient–Able to anticipate and diagnose, as well as strategically respond to students' learning needs using appropriate interventions or strategies that support students in achieving certain learning behaviours.

An outcome of the certification exercise is provided, together with developmental feedback for each teaching and learning dimension to each candidate within two weeks of the certification exercise. Each certification outcome, in the form of letter from the three-member evaluation panel, is a consolidation of the panel members' feedback to the instructor on the seven dimensions of effective teaching and learning. The feedback is given based on panel members' observations of the instructor's behaviour in the video and interview responses. The expectations of the certification panel members regarding the candidates are calibrated regularly, which helped in ensuring that the quality of feedback given by different panels to different candidates is kept fairly consistent.

## DATA COLLECTION

### *Participants*

The purposive sampling technique, which refers to researchers making “the deliberate choice of a participant based on the qualities the participant possesses” (Tongco, 2017), was adopted for this study. While the purposive sampling technique, being a nonprobability sampling technique, may contain limitations due to the subjective manner in selecting the sample (Etikan et al., 2016), this sampling approach was regarded as suitable in the context of this study. This is because information on instructors’ pedagogical shortcomings in a PBL environment was deemed to be best found in this group of participants. The focus of the study was on the characteristics of candidates who did not attain the certification, specifically their effectiveness (or lack thereof) in demonstrating the dimensions of effective teaching and learning. Such candidates typically achieved lower scores, in the lower range of “1” to “2” out of “3”, in each of the dimensions, as compared to candidates who successfully attained the certification, who typically achieved scores in the higher range of “2” to “3” out of “3”.

Participants were 67 instructors who had completed at least 84 hours of training and had worked less than four years in the institution. This group comprised all the candidates who attempted, but did not attain, the certification between 2015 to 2017. Participants involved in the certification exercise were aware that the data associated with their certification attempts would be used for learning and training purposes. The research team collected the data from two key sources: (i) outcomes from the certification exercises, and (ii) the instructors' training records retrieved from the portfolios they submitted for the certification exercises.

The instructors were from different disciplines across the institution, namely applied science, business and management, education development, engineering, hospitality, info-communication, sports and health, and the creative arts.

### ***Data analysis***

The research team de-identified the data before conducting the analysis. The performance scores in the certification outcome were analysed to compare candidates' performance in the respective teaching and learning dimensions and to identify their lowest-scoring dimension.

Thematic analysis, which is a method of identifying, analysing and reporting patterns within data (Braun & Clark, 2006), was used to further examine the developmental feedback provided to instructors in the certification outcome. Coding of the data was conducted to identify common themes in facilitation obstacles observed, specifically in the lowest-scoring teaching and learning dimension, as well as common themes in the recommended actions suggested by the panels for candidates to address their shortcomings. Ideas within each sample qualitative feedback were identified and categorised into themes, and comparisons were made between the frequencies of their occurrences across the samples. The samples were coded by the first author based on the coding schema developed by Leow et al. (2017). Due to the low complexity of the task and data, a single coder was deployed for this study to increase reliability. The reliability of coding was further enhanced through the iterative processes of data collection and analysis. When in doubt about the coding, the first author sought advice and verified the coding criteria with the second author.

The types of training the candidates completed before they attempted the certification exercise were also analysed to inform the candidates' training profiles. Training programmes were typically categorised by the in-house training department into different domains according to the seven dimensions of effective teaching and learning. This information was used to identify whether candidates attended training programmes related to these dimensions.

## RESULTS

The performance outcome scores of the 67 candidates in the seven dimensions of effective teaching and learning, awarded by the panel after their certification interviews, were analysed. Table 3 shows a summary of the scores, ranked in descending order of the dimension, with the most number of candidates scoring a “1”.

Table 3  
*Performance scores of 67 candidates in the seven teaching and learning dimensions*

Dimension	No. of candidates scoring ...			Mean (SD)
	1 (%)	2 (%)	3 (%)	
Facilitation and Scaffolding	58 (86.6)	9 (13.4)	0 (0.0)	1.13 (0.34)
Reflection	45 (67.2)	21 (31.3)	1 (1.5)	1.34 (0.51)
Prior Knowledge & Knowledge and Skills Acquisition	44 (65.7)	23 (34.3)	0 (0.0)	1.34 (0.48)
Collaborative Learning	42 (62.7)	24 (35.8)	1 (1.5)	1.39 (0.52)
Self-directed Learning	40 (59.7)	26 (38.8)	1 (1.5)	1.42 (0.53)
Assessment	37 (55.2)	30 (44.8)	0 (0.0)	1.45 (0.50)
Learning Environment	21 (31.3)	43 (64.2)	3 (4.5)	1.73 (0.54)

The dimension "Facilitation and Scaffolding" had the most number of candidates (58), scoring “1” (i.e., Emerging). This number of candidates scoring “1” is significantly more than that of the next two dimensions, "Reflection" and "Prior Knowledge a Knowledge and Skills Acquisition", with “45” and “44” respectively. Thus, for the purpose of this paper, the authors will be focusing on the dimension “Facilitation and Scaffolding”. This dimension also had the lowest mean score and standard deviation. Overall, the dimension "Facilitation and Scaffolding" is deemed to be the lowest scoring dimension. On the other hand, the dimension "Learning Environment" had the least number of candidates scoring “1” and most number of candidates scoring “3”. The results implied that "Facilitation and Scaffolding" was the predominant dimension that panelists identified the candidates to be weak in.

The developmental feedback for the 58 candidates who scored “1” for "Facilitation and Scaffolding" was further examined to identify the common pedagogical shortcomings demonstrated by these candidates. From the qualitative feedback, the two most common obstacles to effective "Facilitation and Scaffolding" observed and highlighted by the panel was that instructors were inept in asking effective questions, and tended to be leading instead of guiding students in their learning. Table 4 shows examples of feedback from the panel that relate to the two obstacles.



Table 4  
*Common obstacles to effective "Facilitation and Scaffolding"*

Common Obstacle	% of Samples Containing Obstacle	Examples of Feedback Relating to Obstacle
Inept in Asking Effective Questions	52	"Intention of (instructor's) question was unclear" "Questions posed (by instructor) were not derived from the learning issues and seemed irrelevant"
Leading Students' Learning	45	"(Instructor's) scaffolding was focused on leading students towards arriving at correct answers than on helping them evaluate or form their own approaches" "(Instructor) tend to correct students and share answers too quickly and in a leading way"

Along with the identified obstacles, the panel also recommended actions that candidates can consider integrating in their lesson delivery to overcome those obstacles. Table 5 shows the five top common themes in the recommended actions by the panel to improve the "Facilitation and Scaffolding" dimension.

Table 5  
*Common suggested actions for candidates to improve in "Facilitation and Scaffolding"*

Common Themes	Examples of Suggested Actions for Candidate
1 Ask Effective and Targeted Questions	"... <to> check progress of students by not merely going from team to team but more importantly asking students to clarify their approaches and how they plan to execute their creative concepts" "... <to> adopt questioning strategies based on learning gaps identified"
2 Give Students More Time to Explore and Articulate Answers	"... <to> pause longer to elicit responses from the student before asking the next question for student to have more time to reflect and evaluate the question before responding" "... <to> use appropriate wait-time... to let students make meaningful connections <of knowledge> for themselves in an independent manner"
3 Increase Repertoire of Activities	"... <to> include a variety of learning activities, such as gallery walk and mind maps, to help students connect information" "... <to> vary activities or structure of lesson besides just following pre-determined worksheet questions"
4 Provide Closure for Learning Issue/Segment	"... <to> ensure there is closure to questions raised by student... by checking with student on whether a question has been addressed adequately before moving to another discussion point" "... <to> provide closures for the students after each learning segment using visual organiser for example... to help consolidate their understanding"
5 Give Students Autonomy in Learning	"... <to> allow more autonomy for students to interpret the question on their own" "... <to> allow students to freely summarise their learning so far"

The optional training programmes taken by the 67 candidates before they attended the certification interview were analysed. Among the available optional training programmes were five different full-day workshops related to the "Facilitation and Scaffolding" dimension. Examples of such workshops include "Teaching Practices–Scaffolding for Learning" and "Teaching Practices–Listening and Questioning". Overall, more than one third of the group (23 candidates) did not attend any optional training programmes related to the seven teaching and learning dimensions. As there was no formalised peer coaching programme across the institution, the quality of peer coaching in each school was varied.

## DISCUSSION

PBL is a student-centred instructional model in which students need to self-direct their learning to determine what they know and do not know about the problem (Jonassen & Hung, 2015). One of the essential roles of the PBL instructor is facilitation of the learning process via asking students effective questions (Jones et al., 1993). The findings from analysis of the feedback revealed that the 58 candidates who scored particularly poorly in the dimension "Facilitation and Scaffolding" demonstrated an inability to ask effective questions. They tended to ask leading questions instead of guiding students' learning through effective questioning by probing for understanding or misunderstanding, challenging students' assumptions or relating to students' prior knowledge and experience. This same group of candidates also tended to display an inclination to arrive hastily at a solution. This attribute is a common phenomenon in didactic forms of delivery and it is within expectation that such traits hinder the effective facilitation of the candidates in a student-centred lesson environment.

The findings mirror the study by Leow et al. (2017) which was conducted on candidates who attempted but did not attain the certification in 2015 at the same institution. The current study expanded the research to include candidates from 2016 and 2017 as well, and the results showed that across the three years (2015-2017), the weakest teaching and learning dimension was predominantly "Facilitation and Scaffolding".

### *Applying effective questioning skills*

The current findings reinforce the need to strengthen instructors' questioning skills in the PBL classroom, which can include asking more effective and targeted questions, giving students more time to explore and articulate answers, increasing the repertoire of activities, and providing closure for learning issues and segments, as recommended by the panel of the certification exercise. For example, the panel advised the types of targeted questions that the instructor can ask to "check progress of students by not merely going from team to team but more importantly asking students to clarify their approaches and how they plan to execute their creative concepts" (quote taken from "Suggested Actions to Candidates", listed in Table 5). More examples on how instructors can demonstrate good questioning skills can also be found in Table 5.

Studies have found that effective questions facilitate active group discussions and help students identify their learning needs (Barrows & Tamblyn, 1980; Barrows, 1988). Asking good open-ended questions that encourage understanding, such as those that allow students to evaluate, make priorities and take decisions, promote constructive group dynamics and moves the discussion forward are some of the basic principles for becoming a successful PBL instructor (Azer, 2005).

### ***Providing autonomy to students***

This study confirmed the findings of Ertmer and Simons (2006), and Nariman and Chrispeels (2016), that a common challenge faced by PBL instructors involved having to let go of their control in the classroom and let students experiment with their peers in their learning. Instructors should be reminded to give students the autonomy to chart and evaluate their own learning, and to strike a balance between supporting students' learning and letting students embrace self-directed learning (Conway & Little, 2000). Giving students autonomy in their learning and encouraging self-directed learning skills allows students to learn how to deal with problems in the future, preparing them to become independent, lifelong learners (Barrows & Tamblyn, 1980). The more student ownership there is within the learning process, the more engagement there will be, which will lead to deeper learning (Blumenfeld et al., 2006). Table 5 provided examples of how students may be given autonomy in the classroom. When instructors take over for students who are employing learning strategies that the instructor deems will not lead to a positive outcome, it can have a negative impact on students' engagement and intrinsic motivation (Vermunt & Verloop, 1999). Instructors should, in fact, avoid dominating group discussions but rather, to focus on facilitating the learning process instead (Azer, 2005).

### ***Professional development for instructors***

The data analysis of the candidates' training records indicated that prior to their certification attempt, most candidates completed very few to no optional training programmes related to the seven dimensions of teaching and learning. The lack of additional training beyond the initial prescribed 84 training hours may have affected the group's level of competence in effective facilitation and correspondingly, their level of preparedness for the certification. This could also suggest the need to strengthen the support for instructors beyond the prescribed 84 training hours, or re-look at the scope of the prescribed training itself.

Informed by the results of this study, the institution has since revised the prescribed foundation training programme that new instructors have to take before they facilitate classes. Training segments that equip participants to scaffold student learning have been added. This applies to both instructors who are facilitating pre-employment training classes, typically with students between the age of 17 to 19 years, and instructors who are facilitating continuing education training classes, typically with students who are working professionals looking to upgrade their skills. As learner needs continue to evolve, the type of training support provided to instructors to prepare them for the facilitation of active learning in the classroom would have to be adjusted as well. The institution supports lifelong learning and constant deepening of instructors' expertise, which would also include grooming experienced instructors to be peer coaches to provide one-to-one coaching to new instructors.

## IMPLICATIONS FOR POLICY AND PRACTICE

As PBL involves a dynamic interaction of the teacher's beliefs, goals, and knowledge (Hmelo-Silver & Barrows, 2006), the actions demonstrated by instructors in the PBL classroom could stem from their previous teaching or learning experiences, or their beliefs and understanding of the social constructivism approach to learning. Instructors who have teaching or education experiences that were instructor-centric may find it challenging to make the paradigm shift to student-centred learning in their PBL classrooms (Zin et al., 2015). Further studies in these aspects would provide more insights on the obstacles to effective facilitation.

### *Policy*

From a capability development perspective, the low number of optional training programmes undertaken by candidates in this study may potentially be indicative of their general unawareness of their competency gaps, owing to a lack of feedback prior to attempting their first certification attempt. It could also potentially be due to an inability or a lack of desire on the candidates' part to make time for such forms of training owing to the regular pressures of work within their disciplines such as curriculum delivery, supervision of projects, research and development with industry collaborators, and so forth. This opens up opportunities for future work to be done, from the professional development perspective. Staff development should focus on teaching within the whole institution, not on those individuals who present themselves at voluntary workshops (Biggs, 2001).

Research studies highlight the importance of pedagogical training and support of instructors to build their competencies in creating effective constructivist learning environments for their students (Lunenberg & Korthagen, 2003; Tynjälä, 1999). When trainings are based on the constructivist philosophy and the PBL method, guided by an experienced facilitator and with the provision of collaborative learning opportunities among peers, the instructor trainee gets to experience the PBL environment from the student's perspective (Salinitri et al., 2015). Such instructor-training set in social constructivist learning environments enhances instructors' levels of critical thinking and metacognitive awareness, which they can in turn practice and apply in their social constructivist classrooms (Kroll & Laboskey, 1996). Recent studies also suggested the use of coaching, typically comprising of goal setting, questioning and data gathering processes, to enhance the instructor's professional development (DeMonte, 2013; Knight & van Nieuwerburgh, 2012) and to encourage the shift from instructor-centred learning to student-centred learning within classrooms (Rhodes & Beneicke, 2002).

This study provides new opportunities to create a more formalised framework that constructively supports faculty development, which does not leave training to chance or to personal choice. Further, the data can inform future professional development courses that prepares new instructors for facilitation, that such courses would be more targeted at the common pedagogical shortcomings, particularly on how to ask effective questions and how to provide autonomy for students to learn in a PBL classroom.

### *Practices*

Amateur instructors who are new to the education industry or PBL could be less cognisant of when and how to probe students to help them in their learning. They may not be well-versed in the type and amount of questions to pose to students while balancing the level of autonomy students should be given to explore their answers. On the other hand, instructors who have been with the education industry and teaching didactically for a long time may be fixated on their old ways of giving students direct instructions and may not be aware of how self-directed learning can be encouraged in the PBL classroom. Provision of professional development opportunities for these instructors at an early stage of their employment with the institution, before the certification exercise, would allow them to learn facilitation strategies from both the trainers and fellow participants. Professional development focused on specific instructional practices increases instructors' use of

those practices in the classroom, and such effects are further enhanced by active learning by instructors through regular interactions with colleagues to discuss their work and their students' learning (Desimone et al., 2002). Beyond the prescribed foundational training programmes, the institution can also increase opportunities for instructors to exchange best practices with colleagues through a community of practices and informal sharing sessions to build their skills in managing the potentially different needs of individual students and cohorts.

Regular training needs analysis can also be conducted for instructors even after they have attained the certification. Change in teaching practices would occur if instructors experienced consistent, high-quality professional development (Desimone et al., 2002). Strategic and systematic planning for professional development should hence be a focus in the institution.

In addition, strengthening peer coaching support for instructors through implementation of a more rigorous, standardised peer coaching guideline across the institution can be a way to engage instructors in more feedback conversations with experienced peer coaches on their facilitation competency. To candidates who did not attain the certification, working with their peer coaches on targeted goal-setting and reality checks of their pedagogical shortcomings based on the feedback given by the panel can be one of the approaches to close their competency gaps. Video recordings of candidates' lessons serve as valuable artefacts for peer coaches to initiate discussions, encourage reflections and provide feedback on candidates' blind spots in their lesson delivery (Tripp & Rich, 2012; Wu & Kao, 2008) before the candidates re-attempt the certification exercise.

## CONCLUSION

This study identified, from the pool of 67 instructors, "Facilitation and Scaffolding" as the dimension of teaching and learning which the instructors did not perform well in. Being inept in asking effective questions and having the tendency to "lead instead of guide" students in their learning were identified as common obstacles to effective facilitation. These findings suggest that improvements are needed to support instructors in these areas, which can be in the form of, but not limited to, developing relevant training programmes for instructors to improve their questioning skills.

### *Limitations*

A limitation of the study was that analysis on the common pedagogical shortcomings of instructors was done based on developmental feedback provided to the instructors in the certification outcome. Interviews with the candidates and analysis of candidates' video recordings may provide more information on the factors that influence their facilitation.

Another limitation of the study was the adoption of purposive sampling, in which only candidates who did not attain the certificate in facilitation were sampled. Further studies could look into widening the sampling scope to provide more insights to the topic, such as including the students' or the peer coaches' perceptions of common pedagogical shortcomings of instructor.

An additional limitation is that the coding was done by a single coder. While high intra-reliability can be achieved in coding done by a single coder, having more than one coder may reduce potential bias and subjectivity present in the data coded by a single coder.

### ***Further research***

To broaden our understanding of the obstacles to effective facilitation, more work needs to be done to ascertain belief systems and attitudes toward professional training and development. In turn, a more formalised approach to support faculty development is worth considering that could be worked into the development plan of each faculty and not be left to chance.

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## REFERENCES

- Assen, J. H. E., Meijers, F., Otting, H., & Poell, R. F. (2016). Explaining discrepancies between teacher beliefs and teacher interventions in a problem-based learning environment: A mixed methods study. *Teaching and teacher education*, 60, 12-23. <http://dx.doi.org/10.1016/j.tate.2016.07.022>
- Azer, S. A. (2005). Challenges facing PBL tutors: 12 tips for successful group facilitation. *Medical Teacher*, 27(8), 676-681. <http://dx.doi.org/10.1080/01421590500313001>
- Azzarito, L., & Ennis, C. D. (2003). A sense of connection: Toward social constructivist physical education. *Sport, Education and Society*, 8(2), 179-197. <http://dx.doi.org/10.1080/13573320309255>
- Baecher, L., Kung, S. C., Jewkes, A. M., & Rosalia, C. (2013). The role of video for self-evaluation in early field experiences. *Teaching and Teacher Education*, 36, 189-197. <http://dx.doi.org/10.1016/j.tate.2013.08.001>
- Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education* (Vol. 1). Springer Publishing Company.
- Barrows, H. S. (1988). *The tutorial process*. Springfield, Ill.: Southern Illinois University School of Medicine.
- Biggs, J. (2001). The reflective institution: Assuring and enhancing the quality of teaching and learning. *Higher Education*, 41(3), 221-238. <http://dx.doi.org/10.1023/A:1004181331049>
- Blumenfeld, P. C., Kempler, T. M., & Krajcik, J. S. (2006). *Motivation and cognitive engagement in learning environments*. Cambridge: Cambridge University Press. <https://doi.org/10.1017/CBO9780511816833.029>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101. <http://dx.doi.org/10.1191/1478088706qp063oa>
- Cannon, R. (2001). Broadening the context for teaching evaluation. *New Directions for Teaching and Learning*, 2001(88), 87-97. <http://dx.doi.org/10.1002/tl.40>
- Conway, J., & Little, P. (2000). Adopting problem-based learning as the preferred institutional approach to teaching and learning: Considerations and challenges. *Journal on Excellence in College Teaching*, 11(2/3), 11-26. <http://celt.muohio.edu/ject/login.php?page=issue.php%3Fv%3D11%26n%3D2%20and%203>
- DeMonte, J. (2013). *High-quality professional development for teachers: Supporting teacher training to improve student learning*. Center for American Progress. <https://files.eric.ed.gov/fulltext/ED561095.pdf>
- Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis*, 24(2), 81-112. <http://dx.doi.org/10.3102/01623737024002081>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1-4. <http://dx.doi.org/10.11648/j.ajtas.20160501.11>
- Goe, L., Biggers, K., & Croft, A. (2012). *Linking teacher evaluation to professional development: Focusing on improving teaching and learning*. Research & policy brief. National Comprehensive Center for Teacher Quality. <https://files.eric.ed.gov/fulltext/ED532775.pdf>
- Goh, K. (2014). What good teachers do to promote effective student learning in a problem-based learning environment. *Australian Journal of Educational & Developmental Psychology*, 14, 159-166. <https://files.eric.ed.gov/fulltext/EJ1041678.pdf>
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, 16(3), 235-266. <http://dx.doi.org/10.1023/b:edpr.0000034022.16470.f3>
- Hmelo-Silver, C. E., & Barrows, H. S. (2006). Goals and strategies of a problem-based learning facilitator. *Interdisciplinary Journal of Problem-Based Learning*, 1(1), 4. <http://dx.doi.org/10.7771/1541-5015.1004>
- Hmelo-Silver, C. E. (2013). Creating a learning space in problem-based learning. *Interdisciplinary Journal of Problem-based Learning*, 7(1), 5. <http://dx.doi.org/10.7771/1541-5015.1334>

- Hung, W. (2009). The 9-step problem design process for problem-based learning: Application of the 3C3R model. *Educational Research Review*, 4(2), 118-141. <http://dx.doi.org/10.1016/j.edurev.2008.12.001>
- Jonassen, D. H., & Hung, W. (2015). All problems are not equal: Implications for problem-based learning. *Essential Readings in Problem-based Learning*, 2(2), 7-41. <http://dx.doi.org/10.7771/1541-5015.1080>
- Jones, R. O., Donnelly, M. B., Nash, P. P., Young, B., & Schwartz, R. W. (1993). The ongoing development of a problem-based surgery clerkship: Year three. *Medical Teacher*, 15(2-3), 207-215. <http://dx.doi.org/10.3109/01421599309006715>
- Jung, B., Tryssenaar, J., & Wilkins, S. (2005). Becoming a tutor: exploring the learning experiences and needs of novice tutors in a PBL programme. *Medical Teacher*, 27(7), 606-612. <http://dx.doi.org/10.1080/01421590500069728>
- Kapur, M., & Kinzer, C. K. (2007). Examining the effects of problem type in a synchronous computer-supported collaborative learning (CSCL) environment. *Educational Technology Research and Development*, 55(5), 439-459. <http://dx.doi.org/10.1007/s11423-007-9045-6>
- Katz, M. (1996). Professional growth is a journey not a destination. *People Dynamics*, 14, 26-29.
- Knight, J., & van Nieuwerburgh, C. (2012). Instructional coaching: A focus on practice. *Coaching: An International Journal of Theory, Research and Practice*, 5(2), 100-112. <http://dx.doi.org/10.1080/17521882.2012.707668>
- Kong, S. C., Shroff, R. H., & Hung, H. K. (2009). A web-enabled video system for self-reflection by student teachers using a guiding framework. *Australasian Journal of Educational Technology*, 25(4). <https://doi.org/10.14742/ajet.1128>
- Kroll, L.R., & Laboskey, V. K. (1996). Practicing what we preach: Constructivism in a teacher education program. *Action in Teacher Education*, 18(2), 63-72. <http://dx.doi.org/10.1080/01626620.1996.10462834>
- Leow, Koh, & Chua (2017, June 26-29). *What is the problem? Barriers to effective facilitation in a problem-based learning classroom* [Conference presentation]. Canada International Conference on Education 2017, Toronto, ON. <https://infonomics-society.org/cice-2017/cice-abstract-199/>
- Ling, A., & Loy-Pang, K. J. (2007, Mar 8). *Student's perceptions of good problem-based learning facilitation* [Symposium presentation]. International Problem-Based Learning Symposium 2007, Republic Polytechnic, Singapore <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.117.2723&rep=rep1&type=pdf>
- Lunenberg, M., & Korthagen, F. A. J. (2003). Teacher educators and student-directed learning. *Teaching and Teacher Education*, 19(1), 29-44. [http://dx.doi.org/10.1016/S0742-051X\(02\)00092-6](http://dx.doi.org/10.1016/S0742-051X(02)00092-6)
- Nariman, N., & Chrispeels, J. (2016). PBL in the era of reform standards: Challenges and benefits perceived by teachers in one elementary school. *Interdisciplinary Journal of Problem-based Learning*, 10(1). <http://dx.doi.org/10.7771/1541-5015.1521>
- Rhodes, C., & Beneicke, S. (2002). Coaching, mentoring and peer-networking: Challenges for the management of teacher professional development in schools. *Journal of In-Service Education*, 28(2), 297-310. <https://doi.org/10.1080/13674580200200184>
- Salinitri, F. D., Wilhelm, S. M., & Crabtree, B. L. (2015). Facilitating facilitators: Enhancing PBL through a structured facilitator development program. *Interdisciplinary Journal of Problem-based Learning*, 9(1), 11. <http://dx.doi.org/10.7771/1541-5015.1509>
- Schmidt, H. G. (1993). Foundations of problem-based learning: some explanatory notes. *Medical Education*, 27(5), 422-432. <http://dx.doi.org/10.1111/j.1365-2923.1993.tb00296.x>
- Shepherd, C. E., & Hannafin, M. J. (2008). Examining preservice teacher inquiry through video-based, formative assessment e-portfolios. *Journal of Computing in Teacher Education*, 25(1), 31-37.
- Tongco, M. D. C. (2007). Purposive sampling as a tool for informant selection. *Ethnobotany Research and Applications*, 5, 147-158. <http://hdl.handle.net/10125/227>
- Tripp, T. R., & Rich, P. J. (2012). The influence of video analysis on the process of teacher change. *Teaching and Teacher Education*, 28(5), 728-739. <https://doi.org/10.1016/j.tate.2012.01.011>



- Tynjälä, P. (1999). Towards expert knowledge? A comparison between a constructivist and a traditional learning environment in the university. *International Journal of Educational Research*, 31(5), 357-442. [http://dx.doi.org/10.1016/S0883-0355\(99\)00012-9](http://dx.doi.org/10.1016/S0883-0355(99)00012-9)
- Vermunt, J. D., & Verloop, N. (1999). Congruence and friction between learning and teaching. *Learning and Instruction*, 9(3), 257-280. [http://dx.doi.org/10.1016/s0959-4752\(98\)00028-0](http://dx.doi.org/10.1016/s0959-4752(98)00028-0)
- Wu, C. C., & Kao, H. C. (2008). Streaming videos in peer assessment to support training pre-service teachers. *Journal of Educational Technology & Society*, 11(1), 45-55. [https://www.j-ets.net/collection/published-issues/11\\_1](https://www.j-ets.net/collection/published-issues/11_1)
- Xu, Y. (2004). Teacher portfolios: An effective way to assess teacher performance and enhance learning. *Childhood Education*, 80(4), 198-201. <http://dx.doi.org/10.1080/00094056.2004.10522231>
- Zin, W. H. W. M., Williams, A., & Sher, W. (2015, July 6-9). *Challenges of introducing PBL in engineering: lecturers' and students' perspectives* [Conference paper presentation]. 5th International Research Symposium on Problem-based Learning, Arrasate/Mondragón, Spain, 299-311. <http://hdl.handle.net/1959.13/1327344> ■