Instr Sci (2014) 42:795–815
DOI 10.1007/s11251-013-9306-1

Student perceptions of facilitators' social congruence, use of expertise and cognitive congruence in problem-based learning

Elaine H. J. Yew · Janice J. Y. Yong

Received: 3 January 2013 / Accepted: 4 December 2013 / Published online: 11 December 2013

Abstract In problem-based learning (PBL), the role of a tutor or facilitator is different from what is typically considered as the role of a traditional teacher. In addition to being a subject-matter expert, the facilitator is also expected to be 'socially' and 'cognitively congruent'. In this study, we analyze the survey responses from more than 10,000 students in order to better understand their perceptions of what makes a good or poor facilitator, and to identify specific qualities related to social congruence, cognitive congruence and use of expertise. Students' comments for the highest and lowest scoring groups of facilitators were analyzed qualitatively using inductive data analysis strategies. The following themes were identified: for social congruence—facilitator personality, relating to students, professionalism, motivating students, and learning environment; for cognitive congruence—scaffolding learning, and communication skills; for use of expertise—content knowledge and experience, and stretching students' learning. Coding of students' feedback also demonstrated that students most frequently commented on issues related to facilitators' social congruence. Our findings indicate that social congruence encompasses skills which facilitators may improve on. We also argue that understanding students' perspectives is critical especially in a learner-centred approach such as PBL and therefore propose that our findings provide useful input for the professional development of PBL facilitators.

Keywords Cognitive congruence · Facilitation · Problem-based learning · Social congruence · Student perception · Use of expertise

E. H. J. Yew (✉)
Centre for Educational Development, Republic Polytechnic, 9 Woodlands Ave 9, Singapore 738964, Singapore
e-mail: elaine_yew@rp.edu.sg

J. J. Y. Yong
School of Applied Science, Republic Polytechnic, Singapore, Singapore

In problem-based learning (PBL), the role of a tutor or facilitator is considerably different from what is typically considered as the role of a traditional teacher. As described by Barrows and Tamblyn (1980), the facilitator is a metacognitive coach and mentor who probes students to think more deeply and critically and who models for them the types of questions that they should be asking themselves during problem-solving (Collins et al. 1989; Hmelo-Silver 2004). The facilitator also promotes effective group functioning, monitors students' learning progress, encourages active contributions from team members and intervenes where necessary (Barrows 1988; Maudsley, 1999; Mayo et al. 1995; Wetzel 1996). Moreover, the facilitator should also take a genuine interest in the students and their learning process and seek to develop a collegial and facilitative relationship with the students that is in line with the participatory, collaborative and reflective practice of PBL (Maudsley 1999; Schmidt and Moust 1995).

The role of the PBL facilitator is therefore a complex one and many studies have sought to investigate the characteristics of effective facilitators. Schmidt and Moust (1995) provide a useful framework of an effective tutor that includes three characteristics they propose to be important for effective facilitation: use of expertise, social congruence and cognitive congruence. These three characteristics are reviewed and discussed in greater detail in the sections below.

Use of expertise

As reviewed by Dolmans et al. (2002), one trend of studies examining characteristics of effective facilitators was the rather extensive research into the differences between content expert and non-content expert tutors. The results were inconclusive with some studies demonstrating that content expertise had a positive impact on student learning outcomes (Davis et al. 1992; Schmidt 1994; Schmidt et al. 1993) while other studies indicating no differences (Des Marchais and Black 1991; Groves et al. 2005; Swanson et al. 1990). As noted by Schmidt (1994), subject matter expertise appears to have a greater influence on students' learning when students had limited prior knowledge or when the resources provided lacked sufficient scaffolding or structure. Thus one possible reason for the inconclusive findings could be that the studies which demonstrated no effect of subject matter expertise on students' learning were generally conducted using learning materials that were well-structured or where students had a reasonable amount of prior knowledge and vice versa (Schmidt 1994). Another possible reason for the contradictory findings, as commented by Dolmans et al. (2002), could be due to the concept of 'subject-matter expertise of the tutor' having a wide range of definitions, with some studies using very rigorous definitions of content expertise while others using broader definitions based on the academic level of the staff to distinguish between experts and non-experts.

Social congruence

Besides subject matter expertise, studies on students' perceptions of facilitators have identified other characteristics of effective facilitators. One key characteristic focuses on the facilitator's social congruence. Social congruence refers to interpersonal qualities such as the ability to communicate informally and empathically with students, and hence being able to create a learning environment that encourages an open exchange of ideas (Schmidt and Moust 1995). A study by Kassab et al. (2006) studying the perceptions of medical

students ($n = 276$) from Bahrain found that while students valued content expertise and facilitative skills of the tutors, in addition to those skills, majority of the narrative comments of tutor characteristics focused on tutors being able to establish good rapport with students, for example by respecting their opinions, understanding their feelings and building good relationships. This is in line with what Kaufman and Holmes (1996) found in their study whereby medical students in that educational context expected the PBL tutor to not only be skillful in group facilitation, able to share relevant clinical expertise and anecdotes, but also to have good interpersonal skills such as being friendly and approachable.

These views were similarly echoed by PBL tutors themselves in another study by Papinczak (2010) who investigated the perceptions of both medical students and their tutors on the 'ideal' PBL tutor. Both tutors and students highlighted the importance of student–teacher rapport and the need to develop positive student-tutor working relationships.

A study by Chng et al. (2011) also examined the impact of the social congruence of tutors on students' learning. They found that the social congruence of tutors had a significant influence on students' learning process as well as their eventual learning outcomes as measured by a concept recall test at the end of each PBL learning phase.

Cognitive congruence

The term 'cognitive congruence' appears to be coined by Cornwall (1979) in his explanation on why peer tutors might be better than faculty experts in helping students master concepts. He suggested that peer tutors are likely to have a cognitive schema or knowledge base that is relatively similar to the students and it is this 'cognitive congruence' that would enable them to communicate in language that the students would understand as well as to explain concepts in ways that are easily grasped by them. Moust and Schmidt (1994) developed and validated an instrument to measure tutor characteristics including cognitive congruence. They found that indeed student tutors were rated significantly better than staff tutors in terms of their cognitive congruence. Through further interviews with students, they found that student tutors were deemed to be better able to understand the learning challenges students face in understanding and mastering the subject matter. Similar findings were also reported by Lockspeiser et al. (2008) who found that students valued the cognitive and social congruence of peer tutors in an undergraduate medical programme.

While studies on peer tutors indicate that student tutors generally naturally are cognitively congruent with students, this quality of 'cognitive congruence' is important in staff tutors too. Schmidt and Moust (1995) suggested that both subject-matter expertise and social congruence are necessary conditions for cognitive congruence to exist. They defined cognitive congruence as a tutors' ability to express oneself in the language of students, using the concepts they use, and explaining things in ways that are easily grasped by students. They hypothesized that a tutor who is more socially congruent and able to use subject matter expertise better, would be more cognitively congruent. Using structural equation modelling, they demonstrated that both social congruence and subject expertise influenced cognitive congruence, which in turn influenced tutorial group functioning and this indirectly affected the level of student achievement through an increase in time spent on self-study. Social congruence directly influenced group functioning during the problem-solving process while subject-matter expertise of tutors had a slightly direct positive impact on student achievement. Hence, this study showed that effective tutoring that results in better student achievement requires both content knowledge as well as the ability

to interact with students on a personal level and to utilize language that is easily understood by students.

Current gaps in the literature on characteristics of effective facilitators

The studies reviewed above provide useful insight into the three broad characteristics of effective PBL facilitators, namely, use of expertise, social congruence and cognitive congruence. However there remain several gaps in our current understanding of students' perspectives of what makes a good facilitator. First, although the framework by Schmidt and Moust (1995) is a useful one, it is inconclusive which characteristic (i.e. use of expertise, social congruence or cognitive congruence), from the students' perspective, has the greatest impact on their perception of the facilitator and on their learning in the PBL classroom. Secondly, most of the studies on students' perspective of PBL facilitators were conducted on medical students (e.g. Caplow et al. 1997; Das et al. 2002; Dolmans et al. 2006; Groves et al. 2005; Kassab et al., 2006; Papinczak et al. 2009; Steinert 2004; van Wyk and Mclean 2007; Yee et al. 2006). Although there are a few studies exploring students' perception of PBL in other disciplines, including high school geography (Yeung 2010), accountancy (Stanley and Marsden 2012), tourism-related subjects (Huang 2005; Kivela and Kivela 2005; Zwaal and Otting 2010), engineering (Henry et al. 2012), physiotherapy, computer engineering and psychology (Dahlgren and Dahlgren 2002), these studies focused more on examining students' experience in the process of PBL and did not look in depth into students' views of effective facilitators. For example the study by Zwaal and Otting (2010) found that students generally rated the performance of their PBL tutors to be above average while in the study by Kivela and Kivela (2005), an analysis of more than 480 student log comments revealed that students viewed the PBL teacher as playing an important role in encouraging independent learning, critical thinking and providing guidance. However there was no further examination on students' perspectives of the characteristics of effective facilitators in either study. There is therefore clearly a gap in the current understanding of the perceptions of non-medical students on the characteristics of effective facilitators. As seen from the citations above, PBL is currently implemented not only in medical education but across a wide range of disciplines and levels. It is therefore important to find out to what extent previous studies that were mostly based on medical students may be generalized, as well as to identify specific characteristics of effective facilitators from a more diverse group of students. Thirdly, most of the previous studies examining students' perceptions of effective facilitators had a rather small sample size of hundred students or less, thus further limiting the generalizability of the findings.

The goal of this study therefore was to explore the perceptions of a very large group of students from diverse disciplines (survey responses from more than 10,000 students and from a range of more than 30 diploma programmes), on what makes a good or poor facilitator, with a specific focus on the following questions:

- What are the specific qualities that may better inform our understanding of use of expertise, social congruence and cognitive congruence, particularly from the viewpoint of students?
- Out of the three categories of tutor characteristics, namely social congruence, cognitive congruence or use of expertise, which has the greatest impact on students' perception of the facilitator?

– To what extent, if at all, do other variables such as the facilitators' gender and discipline, influence students' perception of the facilitator?

In so doing, we sought to address the current gap in terms of the limited studies examining the perceptions of tertiary non-medical students on an effective PBL facilitator and to improve the generalizability of our findings through a much larger sample size.

Methods

Ethical considerations

Ethical approval from the institution's ethics review committee was received for this research. The data obtained were first de-identified by a neutral third party (administrative staff) who was not participating in this study so that that neither students nor facilitators could be identified by the researchers. As this student survey is part of an institutional academic quality process to provide feedback on the facilitators and the modules each semester, it is compulsory for all students to respond to the survey.

Educational context

This study was conducted in a polytechnic in Singapore which delivers more than 230 different modules each semester from a wide range of more than 30 programmes including diplomas in Biomedical Sciences, Information Technology, Aerospace Engineering, Sports and Exercise Sciences and New Media. Majority of the modules are conducted using a PBL approach where each facilitator facilitates at least one class of about 25 students, once a week, over a period of 15 weeks. At the end of each semester, students are required to submit anonymous feedback via an online student feedback survey. For the academic year and semester that this study was based on (year 2011 semester 1), a 96.8 % student response rate ($n = 12{,}358$) providing feedback to all facilitators ($n = 1{,}065$) was obtained. The mean age of the cohort of students was 18.7 and the percentages of male and female students were 51.8 and 48.2 % respectively.

Instrument

The student feedback survey was adapted from a validated instrument by Schmidt and Moust (1995). The adapted survey in its exact form has been previously validated within this same educational context using confirmatory factor analysis and was found to be both valid and reliable (Williams et al. 2011). For the purpose of this study, the data for this academic year and semester were used to reconfirm the validity of the instrument. The results revealed that the data fitted the hypothesised model well and that the psychometric characteristics of the instrument were adequate, with RMSEA = 0.047, CFI = 0.984 and GFI = 0.987. The survey consists of ten statements for students to indicate how much they agreed with each statement on a five-point Likert scale ranging from 'Not true at all' to 'Very true for me'. These ten statements provide facilitators with feedback on their facilitation skills with respect to their social congruence, cognitive congruence and use of expertise. There are also two optional open-ended questions for students to indicate areas in which the facilitator is good at and areas in which the facilitator needs to improve in.

Social congruence which reflects how well a facilitator is socially aligned with the students was measured by four items: "I was not afraid to tell the facilitator when I did not understand something"; "The facilitator showed that he/she liked informal contact with us"; "The facilitator appreciated our efforts", and "The facilitator showed interest in our personal lives". Secondly, cognitive congruence which indicates the ability of a facilitator to communicate and explain the subject matter using words and concepts easily grasped by students was measured by four items in the questionnaire: "The facilitator asked questions that helped us understand the subject"; "The facilitator interrupted us several times, which disturbed the group discussion on the problem/learning task of the day"; "The facilitator helped us to understand the topics at hand", and "The facilitator unnecessarily used words or jargon that were difficult for me to understand". Finally, use of expertise was measured by two items: "The facilitator used his/her content knowledge to help us" and "The facilitator has a lot of content knowledge about this module".

Analyses

The mean scores of each category of facilitator characteristics (i.e. social congruence, cognitive congruence and use of expertise) ($n = 1{,}065$) were obtained. Facilitators (identified only by a random number) were ranked from high to low based on the scores obtained for each category. The top and bottom groups of facilitators for social congruence ($n = 12$ and $n = 45$ respectively), cognitive congruence ($n = 7$ and $n = 49$ respectively) and use of expertise ($n = 5$ and $n = 42$ respectively) were defined based on scores that were two standard deviations above and below the mean score for the respective category. Students' open-ended feedback for facilitators from these two top and bottom groups from each category was analysed further using inductive data analysis procedure (Ryan and Bernard 2003; Thomas 2006). In this procedure, the two authors independently read through the texts to familiarize themselves with the content and to gain an initial understanding of the ideas within the feedback from students. They then independently performed preliminary identification of common categories and themes from 14.8 % ($n = 1{,}102$ statements) of the open-ended feedback. Discussions were then carried out to agree on initial themes and to reconcile any differences in opinions. Following that, the remaining data ($n = 6{,}360$ statements) from a total of 7,462 statements were equally distributed between the two authors for further analysis. The identified categories and themes were then cross-checked for comparison, with categories combined when the meanings were similar so as to reduce overlaps and to result in the key nine summary categories that were viewed to be the most important themes with respect to the research objectives. Due to the relatively simple textual nature of the open-ended feedback, the main techniques used to identify themes were by identifying repetitions as well as similarities and differences (e.g. contrasts of comments for facilitators who were rated well by students and for those who were not) as suggested by Ryan and Bernard (2003).

In order to provide insights on the category of facilitator characteristic that had the greatest impact on students' perception of a facilitator, students' open-ended comments ($n = 2{,}264$ statements) for facilitators whose overall scores (i.e. mean score of the three categories) were in the top and bottom groups were coded based on whether the comments were related to social congruence, cognitive congruence or use of expertise. Within each comment, there could be more than one point relating to any of the three facilitator characteristics. Each of these points was individually coded and counted.

Analysis of variance (ANOVA) was used to test whether there were significant differences in terms of students' perceptions of male and female facilitators with the

Table 1 Mean score (Likert scale 1–5) and corresponding standard deviations (SD) for the three categories of facilitator characteristics ($n = 1{,}065$)

Category	Mean score	Standard deviation
Social congruence	3.77	0.352
Cognitive congruence	3.84	0.251
Use of expertise	4.33	0.279
Overall	3.98	0.272

dependent variable being the student feedback survey scores for use of expertise, social congruence, cognitive congruence and overall score, and the gender of the facilitator being the factor. ANOVA was also used to investigate if the academic department of the facilitator had a significant influence on students' perceptions of the facilitators' use of expertise, social congruence, cognitive congruence and overall student feedback score. Eta-squared values were also generated as a measure of the effect size for these analyses.

Results

Descriptive statistics

The descriptive statistics are shown in Table 1. The mean score for use of expertise (4.33 out of a 5 point scale) was highest amongst the facilitators ($n = 1{,}065$) while the mean score for social congruence (3.77) was the lowest of the three tutor characteristics.

Table 2 shows the numbers of facilitators in the top and bottom groups for each category of facilitator behaviour, as well as the total number of student comments for the respective groups of facilitators. The numbers of facilitators who were two standard deviations below the mean score were much larger than the numbers who were two standard deviations above the mean score for all categories.

Themes identified

The inductive data analysis of the written comments from students' feedback on the top and bottom groups of facilitators resulted in the identification of several themes defining students' perspectives of social congruence, cognitive congruence and the use of expertise. Table 3 provides a summary of the identified themes for each category, definitions of the themes and examples of statements that created the respective themes.

Social congruence

The key qualities of facilitators with high and low social congruence, as perceived by students are categorized and described below.

Facilitator personality Students described specific qualities related to their facilitators' personality by expressing their appreciation of facilitators with agreeable personalities such as those who were kind, caring, humorous, approachable, helpful, flexible, patient, and able to trust students. They also identified negative traits which were the opposite of those above, including being unapproachable, inflexible, too serious and strict.

Table 2 Number of facilitators scoring two standard deviations above and below the mean for each category of facilitator characteristics and total number of student comments

Category	Number of facilitators 2 SD above mean	Total number of student comments	Number of facilitators 2 SD below mean	Total number of student comments
Social congruence	12	693	45	2,476
Cognitive congruence	7	275	49	2,704
Use of expertise	5	111	42	2,282
Overall	5	178	41	2,264

Relating to students Facilitators who received high social congruence scores were perceived to be empathetic towards students' needs and expectations. Students felt that the facilitators were able to relate to them, demonstrated a genuine interest in their personal lives and also showed concern for them when needed. In addition, the facilitators were able to communicate actively with students, making the students feel respected and treated as adults or friends.

On the other spectrum, facilitators with low social congruence were viewed by students to be lacking in empathy, not being able to understand the obstacles or difficulties that students were facing in class and life. Due to their lack of interaction with students, these facilitators were unable to establish good relationships with them.

Professionalism Students appreciated facilitators who were professional in their course of work as demonstrated by being well-prepared for class, hardworking, responsible and prompt. Students perceived these facilitators to be good examples and role models whom they are able to look up to.

On the other hand, students described the lack of professionalism by facilitators who were late in releasing assignments, decreasing the amount of time students were able to work on the assignments. Students also perceived facilitators as being unprofessional when they allowed their feelings and moods to get the better of them, thus affecting the classroom environment and students' learning in the process.

Motivating students Students commented that they were motivated when facilitators acknowledged the efforts they had put in. Students appreciated facilitators who were perceived to be aware of the levels of contributions put in by individual students and were able to award grades fairly. These facilitators were able to inspire excellence in students by actively encouraging and by providing constructive feedback to students.

In contrast, facilitators who were perceived by students to be harsh, demoralizing, unable to give constructive feedback and who frequently compared students to other students were not able to motivate students effectively and tended to have low social congruence scores. These facilitators did not readily acknowledge efforts put in by students and were generally perceived as showing favoritism.

Learning environment Facilitators who had high social congruence scores were perceived by students to be able to establish a conducive learning environment in class. They were perceived to be able to set clear expectations so that students knew what was expected

Table 3 Themes identified from the three categories of facilitator characteristics

Facilitator-related characteristic	Theme	Definition of theme	Examples of statements that created theme
Social congruence	Facilitator personality	Qualities related to the facilitator's distinctive character	'…a very nice facilitator to have as we are not afraid to approach him…' 'He is the most formal facilitator we had. We did not interact much with him. The only thing between us is just programming and nothing else. There is very little humour in his class, which makes the lesson slightly dull.'
	Relating to students	The extent of display of empathy and the development of inter-personal relationships with students	'Caring, showing concern for the class when there are people absent, or when we are not doing very well in class.' 'He did not take the effort to remember our names. At the 8th week, he still asked us for our name tags.'
	Professionalism	The extent of display of responsible and exemplary behaviours expected of an educator	'Responsible facilitator who tries his very best to make us understand and learn well under his coaching.' 'She would bring her feelings to the class which is not very pleasant to do so. She should separate personal feelings with lessons as it would affect the lesson and the students.'
	Motivating students	The extent of encouraging and inspiring students in their learning e.g. through feedback and acknowledgement of students' effort	'She encourages the class by giving good comments and correcting the errors that we made so as to help us improve.' 'He was harsh sometimes with his comments and was too direct in his comments.'
	Learning environment	Atmosphere and culture of learning within the classroom as developed by the facilitator	'I feel very comfortable around her and will always ask questions if I do not understand. She is always willing to answer any questions and assist the weaker ones.' 'The facilitator has good intentions by being strict, however it also increases the stress level in the class and this results in some classmates having emotional break down while learning in class.'

Table 3 continued

Facilitator-related characteristic	Theme	Definition of theme	Examples of statements that created theme
Cognitive congruence	Scaffolding learning	The extent in supporting and guiding students in response to students' learning needs and to help them towards attaining the learning goals	'He explains major problems carefully by breaking them down into smaller questions which are very easy to understand.' 'The way that she teaches and the way that she conveys her knowledge to us is kind of hard to understand when she tries to explain the scientific terms because she doesn't like to use layman terms to help us understand.'
	Communication skills	The way in which the facilitator speaks and expresses his ideas to the students	'The facilitator was good at explaining and going slowly, making sure that all of us in the group and as a class understand the topic or problem for the day.' 'I know this isn't his fault being a Westerner so there's this slang which is sometimes difficult to catch. Perhaps, could speak slower and try not to 'eat' words and say them completely.'
Use of expertise	Content knowledge and expertise	Depth and breadth of knowledge and skills in the subject matter	'The facilitator has told us lots of industrial experience, accidents and consequences for us to learn and avoid in future.' 'She seems like she does not understand most of the topics well as she is always quite confused when students start asking her questions.'
	Stretching students' learning	The extent of challenging and stimulating students further in their learning, beyond the immediate learning outcomes	'Good at asking questions to make us think further.' 'His questions are not those that make us think much.'

of them. They were also viewed to be well aware of what was going on amongst the students and how the classroom environment was. They were able to pace their lessons well, manage the class effectively and instill good classroom discipline to ensure smooth delivery of the lesson. Students felt that their lessons were engaging and the classroom environment was comfortable to provide ease of learning with minimal stress.

On the other hand, facilitators with low social congruence scores were perceived by students to lack the qualities mentioned above, and students indicated that their classes were stressful or not conducive for learning.

Cognitive congruence

The qualities of facilitators with high and low cognitive congruence, as perceived by students are categorized and described below.

Scaffolding learning Students generally indicated that they could understand better when facilitators were able to explain difficult concepts using simple words or by breaking them down into simpler concepts. They appreciated facilitators who were able to scaffold learning by using appropriate examples to illustrate their points or by utilising relevant resources to explain concepts. These facilitators were usually described to be systematic in their teaching approach and were able to elaborate well when explaining. They were also able to provide just-in-time help to clear doubts so that students would be able to proceed further in their quest to solve a complex problem or attain all the learning objectives for the day. When learning involved the acquisition of practical skills, the facilitators were able to demonstrate effectively to the students.

Facilitators having low cognitive congruence scores were lacking in the abilities mentioned above, and appeared not to understand students' learning needs. They also had limited strategies to support students' learning, thus preventing them from guiding students effectively.

Another quality of facilitators related to effective scaffolding is questioning skills. Facilitators with high cognitive congruence scores were perceived as being able to raise good questions that were critical to aid the students' understanding of concepts. In contrast, other facilitators posed unclear or ineffective questions that tend to confuse the students and impede their learning.

Communication skills Students appreciated facilitators who were able to communicate effectively by providing precise, straightforward explanations and not rushing through explanations. In contrast, facilitators who did not have appropriate speed, tone or volume when speaking, as well as facilitators who spoke with a slang or unfamiliar accent affected students' comprehension of their explanation and instruction. Long-winded explanations or contradiction in the use of words or instructions led to confusion as well.

Use of expertise

Students' perceptions of the qualities of facilitators with high and low use of expertise are described below.

Content knowledge and expertise Students rated facilitators high on their use of expertise when they were able to demonstrate immense theoretical and/or practical knowledge and skills

Table 4 Percentages of points commented by students relating to each facilitator characteristic for the top and bottom groups of facilitators based on overall score

Facilitator grouping	% of points (total number) related to			Total %
	Social congruence	Cognitive congruence	Use of expertise	
Top group				
Areas facilitator are good at	51.44 (161)	31.63 (99)	10.54 (33)	93.61
Areas facilitator are not good at	3.19 (10)	2.88 (9)	0.32 (1)	6.39
	% of comments for top group			100
Bottom group				
Areas facilitator are good at	10.26 (379)	24.53 (906)	7.44 (275)	42.23
Areas facilitator are not good at	29.43 (1087)	26.80 (990)	1.54 (57)	57.77
	% of comments for bottom group			100

of the subject matter in class. These facilitators were also frequently able to share their work experiences in relevant fields of studies to enrich the students' learning of the subject matter.

Facilitators who seemed to be unsure of the subject matter or were unable to elaborate on the subject matter tended to have lower scores for their use of expertise.

Stretching students' learning Students appreciated facilitators who raised challenging questions to stretch their learning and thinking in class, beyond what was in the immediate learning outcomes of the lessons. This was in contrast to facilitators who did not raise enough questions to stretch students' learning and whom students perceived as asking questions that were not able to invoke deep or critical thinking.

Coding and quantification of comments

Students' open-ended comments for facilitators whose overall scores (i.e. mean score of the three categories) were in the top and bottom groups were coded based on whether the points in the comments were related to social congruence, cognitive congruence or use of expertise. There were two categories of comments: one regarding what the facilitator is good at, and one regarding what the facilitator is not good at. The total percentages and numbers of points relating to the three facilitator characteristics for the two categories of open-ended comments are presented in Table 4.

As indicated in Table 4, counts of points related to each of the three categories (use of expertise, social congruence and cognitive congruence) revealed that facilitators whose student feedback scores were more than or two standard deviations below the overall mean score had 57.7 % negative comments (categories under what the facilitators are not good at) as opposed to 42.2 % positive comments (categorised under what the facilitators are good at). Of the 57.7 % negative comments received, majority of the comments were related to social congruence (29.4 %) and cognitive congruence (26.8 %). In contrast, facilitators in the top group received 93.5 % positive comments as opposed to 6.4 % negative comments. More than half of the positive points were related to the facilitators' social congruence while 31.6 % of the points were associated with cognitive congruence.

Table 5 Distribution of facilitators who scored two standard deviations above and below the mean for overall score based on their academic departments

Academic department	Number of facilitators 2 SD above mean	% out of total facilitators 2 SD above mean	Number of facilitators 2 SD below mean	% out of total facilitators 2 SD below mean
Science	1	20	8	19.51
Engineering	0	0	9	21.95
Sports health	0	0	1	2.44
Information technology	1	20	11	26.83
Hospitality	2	40	4	9.76
Arts technology	0	0	2	4.88
Communications	0	0	0	0
Enterprise and innovation	0	0	3	7.32
Staff training	1	20	3	7.32
	Total 5		Total 41	

The facilitators from the top and bottom groups came from a range of academic departments as indicated in Table 5.

ANOVA results

The results of the one-way ANOVA revealed that there were no significant differences in overall survey score as well as for scores for social and cognitive congruence for male and female facilitators (overall score: $F(1, 1149) = 0.58$, $p = 0.445$; social congruence: $F(1, 1149) = 0.28$, $p = 0.600$; cognitive congruence: $F(1, 1149) = 1.14$, $p = 0.285$). There was a statistically significant difference for the scores on use of expertise ($F(1, 1149) = 6.404$, $p = 0.012$, eta-squared $= 0.006$) where the mean score for males was 4.35 (SD $= 0.28$) and for females 4.31(SD $= 0.27$). Despite the significant difference for the score on use of expertise, the extremely small effect size indicates that this difference is unlikely to be meaningful or noteworthy. One-way ANOVA also revealed that the overall student survey scores, and the scores for social congruence, cognitive congruence and use of expertise differed significantly as a function of the department the facilitator belonged to ($F(9, 1141) = 6.471$, $p = 0.000$, eta-squared $= 0.05$ for social congruence; $F(9, 1141) = 6.688$, $p = 0.000$, eta-squared $= 0.05$ for cognitive congruence; $F(9, 1141) = 5.849$, $p = 0.000$, eta-squared $= 0.04$ for use of expertise and $F(9, 1141) = 6.87$, $p = 0.000$, eta-squared $= 0.05$ for overall score).

Post-hoc analyses using the Bonferroni test showed that only one department (Information technology) was significantly different from the rest on all items (e.g. M $= 3.86$, SD $= 0.28$ for overall score as compared to the institutional mean (M $= 3.99$, SD $= 0.27$). Once again the extremely small effect sizes indicate that these differences for all three characteristics are probably not meaningful or practical ones.

Discussion

The objective of this study was to examine the perceptions of tertiary non-medical students on the characteristics of good and poor facilitators, using the framework of social

congruence, cognitive congruence and use of expertise as developed by Schmidt and Moust (1995). We also sought to identify which of the three facilitator characteristics were perceived by students to have the greatest impact on their rating of a PBL facilitator. In addition, we also investigated if the variables of facilitators' gender and discipline influence students' perception of the facilitator.

In order to investigate the perceptions of tertiary non-medical students on the characteristics of good and poor facilitators, we examined the survey results from a large number of students ($n = 12{,}358$) from a diverse student population in a polytechnic in Singapore. As this group of students generally consists of academically average students who are also likely to be less mature than the generally older university medical students, we had expected differences in their perceptions of PBL facilitators as compared to other studies done previously. Interestingly we found that the students had similar expectations of what makes a good or poor PBL facilitator, thus indicating that across different levels and fields of study, students' expectations relating to tutor or facilitator expertise in PBL remain consistent. In addition, this qualitative study extends what is currently known about students' perceptions of facilitators' social and cognitive congruence, as well as their use of expertise through the themes identified. We will discuss the findings for each of the facilitator characteristics in the sections below.

Social congruence

For the 1,065 facilitators evaluated in this study, the mean score for social congruence was the lowest (3.77) out of the three facilitator characteristics. For facilitators achieving the highest student ratings in overall score, majority of the points (51.44 %) in terms of areas the facilitators are good in, as commented by the students, were related to social congruence. On the other hand, for the group of facilitators scoring the lowest student ratings, students most often commented that they need to improve on areas related to social congruence (29.43 %). These qualities related to rapport and interpersonal relationships between the facilitator and students are similar to those mentioned by medical students in other studies (Kassab et al. 2006; Steinert 2004). Another study performed by Chen et al. (2006) also revealed that medical students were "highly satisfied with the performance of their PBL tutors regardless of whether they were experts in the subject matter" (p. 627). One of the reasons cited by Chen et al. for this is the way PBL tutorials are conducted in a small group setting that allows for optimal mutual interactions between the tutor and students. Our findings further highlight quantitatively the importance students place on the interpersonal qualities and skills of the PBL facilitator. Thus with respect to the second research question stated earlier, our findings suggest that out of the three categories of tutor behaviour, social congruence is the one perceived by students to have the greatest impact on their rating of a PBL facilitator.

The study by Chng et al. (2011) further reinforces the importance of social congruence in the PBL classroom. They found that although all three tutor characteristics (namely, social congruence, cognitive congruence and the use of expertise) impacted students' achievement for the day, only social congruence had a statistically significant impact on students' learning progress as well. Interestingly though, in another study examining the most influential factor in students' determination of an effective teacher in a non-PBL context of public affairs education, the researchers found that 'clear explanations' was the most important factor identified by the university students (Otani et al. 2012). This factor of clarity in explanations was much more influential than the second factor of 'creating a positive and risk-free learning environment'. This difference in findings of students'

perception highlights the very different expectations and roles of the PBL facilitator compared to that of a typical lecturer or instructor. Most academic staff is likely to have come from a more traditional education background and may therefore not be able to immediately understand or realise this difference in roles and how it impacts students.

Moreover, as cited by Papinczak (2010) and Emery et al. (2003), views of the student feedback survey being a popularity or a personality contest is common amongst teaching staff across a wide range of educational contexts. It is therefore likely that the construct of social congruence may be viewed by facilitators merely as a personality trait or a popularity index. We propose that the findings in this study do not support such ideas and shed light on what students value in a highly socially congruent facilitator. Such a facilitator is not just someone who has the natural personality of being fun-loving and humorous, although these certainly are plus points. Instead students also value facilitators who are caring, approachable, genuinely interested in the students and respect them as young adults, empathetic to their learning challenges and needs, professional in lesson preparation and conduct, motivating and able to encourage students to excel, and are able to maintain a conducive learning environment with an appropriate balance of discipline and flexibility. While some of these traits may come more naturally to facilitators who are more extroverted by nature, majority of the qualities can be acquired and strengthened with reflection and effort by facilitators who are keen to improve in order to better help students learn effectively.

Cognitive congruence

Many of the students' comments related to cognitive congruence were associated with effective scaffolding of learning including guiding students in their understanding of concepts as well as questioning skills, and effective communication. These findings are in line with the key role of a PBL facilitator as a form of 'soft scaffold' (Saye and Brush 2002) who models for students the types of questions students should be asking themselves and whose actions provide a framework to guide students in their knowledge construction (De Grave et al. 1999).

One point to note is that students' perceptions of effective tutors in relation to cognitive congruence may not necessarily be what are truly helpful for them. For example, what students in this study perceive as being helpful to their learning e.g. by providing more guidance and explanations as well as just-in-time answers, may in fact be withheld by the facilitator because she deems this as being less helpful to the students as compared to temporarily withholding intervention so as to allow students to be more self-directed in their learning. Similar expectations of PBL students on their tutors have been reported in other studies. For example, Kivela and Kivela (2005) reported that students in a hospitality undergraduate PBL programme indicated that the PBL tutor should provide the "necessary answers and information to facilitate the solving of problems" (p. 461). Das et al. (2002) also found that the medical students who participated in their study frequently commented on the need for the PBL tutor to provide more guidance, answers to all questions and even handouts for the lessons. A minority of medical students in a study by Papinczak et al. (2009) indicated their preference for a facilitator with a more directive approach and who would take more control of the students' learning processes as well as provide more active guidance or intervention. However, such dependency on the PBL tutor is not in line with a holistic concept of scaffolding. As reviewed by van de Pol et al. (2010), the key characteristics of scaffolding include contingency, fading and transfer of responsibility. Contingency refers to being responsive to students' learning needs and adapting the support

provided accordingly. This may include what students in this study mentioned about facilitators being able to use suitable examples or resources to explain and to provide timely assistance to enable them to proceed with the learning tasks. However what was not evident in students' perceptions of scaffolding were the other two components of scaffolding—fading which involves the gradual reduction of scaffolding based on the students' development, and transfer of responsibility which involves actively placing the ownership of learning on the student. Thus while students perceive clear explanations and guiding questions as effective scaffolding, the PBL facilitator will need to take into consideration a much broader definition of scaffolding in order to achieve the key objective of PBL in developing self-directed learners who are able to utilise effective strategies for learning and thinking (Hmelo-Silver and Barrows 2006; Hmelo et al. 1997). The use of scaffolding strategies such as metacognitive questioning, encouraging elaboration, seeking clarifications and application of knowledge (De Grave et al. 1999; Hmelo-Silver and Barrows 2006) may necessarily result in some level of student frustration initially. In such instances, the social congruence of a facilitator would then enable him or her to sense students' frustrations and provide the necessary encouragement to motivate the students to continue with their learning. Thus in PBL facilitation, there is a balance to be maintained between providing too much or too little structure and direction. This balance is one which requires professional judgement and varies with each PBL group and class according to the students' learning needs and progress.

Use of expertise

In the case of the facilitator's use of expertise, this had the highest mean score (4.33) amongst the three facilitator characteristics, indicating that most of the facilitators were perceived by students to be relatively strong in their subject matter knowledge. This was also the facilitator characteristic that was least frequently commented on by the students in the open-ended portion of the survey. In the study by Kassab et al. (2006), they found that the frequency of student comments about effective tutors that were related to good content knowledge made up 22.22 % of the narrative comments, as opposed to a higher frequency of comments related to building of rapport (52.38 %) and helping students (25.40 %). Similar to the findings in our study, the student participants in the study by Kassab et al. (2006) appreciated tutors who were able to provide illustrations from their own clinical experience and who had breadth of knowledge.

The second theme related to the use of the use of expertise identified in this study was "stretching students' learning" e.g. by raising critical or challenging questions. This aspect of the use of expertise was also reported in a study by Gilkison (2003) examining the differences in techniques used by 'content expert' and 'non-content expert' tutors in a PBL class. Her analysis of the interactions in the PBL tutorial groups of a subject matter expert and non-expert tutor revealed that the tutor with content expertise made use of intervention techniques that "raised critical awareness" to a much larger extent (48.1 % of tutor interventions) as compared to the non-expert (38.1 %). Interviews with students also indicated that students valued how the tutor with a medical background was able to raise critical awareness through questions that helped them think about issues they would not have otherwise thought about. On the other hand, other studies comparing the tutor–student interactions in PBL groups led by experts and non-experts found that the former tended to be more teacher-directed and these tutors generally took on a more directive role (Davis et al. 1992; Kaufman and Holmes 1998; Silver and Wilkerson 1991). It is therefore important, as pointed out by Kassab et al. (2006) and Caplow et al. (1997), for tutors to not

only have content expertise but also facilitative expertise. As discussed by various authors (e.g. Hmelo et al. 1997; Mayo et al. 1995), the goals of PBL go beyond the learning objectives of the lesson and include helping students develop reasoning, critical thinking and self-directed learning skills. Thus an effective PBL facilitator's 'use of expertise' should include both the use of content knowledge expertise as well as facilitative expertise.

Other variables influencing students' perception of the facilitator

The third objective of this study was to explore if other factors such as the facilitator's gender or discipline area influenced students' perception of their effectiveness of a PBL facilitator. Results from this study generally indicate that there is no significant difference in students' perceptions of male versus female facilitators. Even though for use of expertise, male facilitators had a statistically significantly higher rating, the effect size was extremely small (eta-squared = 0.006), thus negating the usefulness of this difference.

In the case of the departments that the facilitators belonged to, facilitators from one department (Information technology) received statistically significantly lower scores compared to the other eight academic departments. However once again the effect size was very small (eta-squared = 0.05), thus indicating that the difference is not a meaningful one. We would like to highlight the observation that for all the other departments, there were no statistically significant differences in the students' perceptions of the facilitators. These results are interesting especially since they are from a very large sample size and wide range of academic departments, and they strongly indicate that students' perceptions of facilitators' characteristics are not significantly influenced by the area of discipline being taught or the gender of the facilitator, thus reinforcing the generalizability of the findings from this study across a wide range of disciplines.

Implications for staff development

The findings from this study provide input on what a facilitator can do to be more socially and cognitively congruent and to enhance his or her use of expertise. In addition, these findings also have implications for PBL staff development at the institutional level. As educators in a tertiary education setting, most teaching staff would not argue against the need for cognitive congruence or effective use of one's expertise. However, not all facilitators would be aware of students' needs for a socially congruent facilitator. Thus we recommend that faculty development programmes in PBL increase staff awareness of students' perceptions of socially congruent facilitators, and highlight research findings on how social congruence does impact students' learning process and achievement (Chng et al. 2011; Schmidt and Moust 2000). The authors propose that the findings in this study that describe in detail what students value and suggest for facilitator improvement in the area of social congruence are useful points for facilitators to note and reflect upon.

In the area of cognitive congruence, we have discussed that this requires a delicate balance and ability to monitor and adjust one's facilitation approach based on the specific students' learning needs and challenges. This is a skill that on one hand requires experience, and on the other hand, needs ongoing reflection and feedback in order to improve. Staff development programmes should therefore provide opportunities for self and peer review of one's facilitation, as well as peer-coaching by more experienced and effective facilitators (Orlander et al. 2000). Such support mechanisms are likely to be very useful especially for new PBL facilitators.

Finally, staff development programmes should include specific strategies to help facilitators work towards the larger goals of teaching and learning which include helping students develop reasoning and critical thinking skills, metacognitive thinking and self-directed learning strategies. Opportunities should also be given for facilitators to reflect as well as obtain peer feedback on the impact of their use of expertise (both content knowledge and facilitative expertise) on developing students towards these broader goals of PBL.

Limitations of the study

It is important to note several limitations of this study. First, this study focuses only on students' perceptions without considering the viewpoints of the facilitators. Further studies to examine the tutor's perspective of good facilitation in a non-medical education context should be undertaken to understand if there are any significant differences in the perceptions of roles and values. Secondly, due to the focus and nature of this study, the findings cannot demonstrate a relationship between students' perception of facilitators and their learning outcomes. Supplementing students' self-report with additional data such as students' learning achievements could have provided stronger evidence on the impact of these tutor characteristics on students' learning. Thirdly, it is likely that students' perspectives on facilitators would depend on their perceptions of the value of the PBL approach. However in this study, we were not able to obtain information on this possible relationship, and how (if at all) either perspective influences the other. Also, although we have demonstrated that students' perceptions on facilitators were not influenced by the facilitators' gender or area of discipline, due to the de-identified data we were working with, it was not possible within this study, to examine if the students' own gender and major of study had an impact on their perceptions. Lastly, in the identification of the category of facilitator behaviour that has the greatest impact of students' perception of a facilitator, the assumption made was that students would comment most frequently on what matters most to them. Although we propose that this is a reasonable assumption, it is possible that other non-related factors could have resulted in students commenting most frequently on an issue.

Conclusion

The findings from this study provide an insight into students' viewpoints of what makes a good or poor facilitator and help facilitators and staff developers better understand the specific qualities related to the PBL facilitator's social congruence, cognitive congruence and use of expertise. In particular, we found that out of the three facilitator characteristics, social congruence appeared to have the largest impact on students. While some may question the reliability and validity of findings obtained from student perception, the authors agree with Lea et al. (2003) on the importance of researching and understanding students' expectations and perceptions. They argue that in a student-centred learning environment, it is 'simply good educational practice' (p. 324) to take into account students' needs and expectations in the teaching and learning process. Moreover students are likely to be better able to stay on with a course that meets their learning needs. Indeed this second point is particularly important in a PBL environment where students who have been used to a more traditional teacher-centred teaching approach often face a significant amount of initial discomfort and apprehension. Thus in line with the learner-centred philosophy of

PBL, it is not only valid but necessary to research from students' perspective to better understand their learning needs in order to inform staff professional training and development. From the authors' knowledge, this study is also the first one that examines student survey responses obtained from more than 10,000 students.

Having argued for the validity of this study, we recognize that further studies to examine the tutor's perspective of good facilitation in a similarly broader tertiary non-medical education context should be undertaken to understand the other perspective and to identify if there are any significant differences in the perceptions of roles and values. Similarly additional studies to investigate how these facilitator characteristics directly impact students' learning outcomes (or not) and the extent to which students' perceptions of PBL influences their perception of PBL facilitation should also be examined further. These research efforts are important to provide a balanced view to inform and improve our practice of the complex art of PBL facilitation.

References

Barrows, H. S. (1988). *The tutorial process*. Springfield: Southern Illinois University School of Medicine.

Barrows, H. S., & Tamblyn, R. (1980). *Problem-based learning: An approach to medical education*. New York: Springer.

Caplow, J. A. H., Donaldson, J. F., Kardash, C. A., & Hosokawa, M. (1997). Learning in a problem-based medical curriculum: students' conceptions. *Medical Education, 31*(6), 440–447.

Chen, J., Lee, M., Lee, H., Wang, Y., Lin, L., & Yang, J. (2006). An online evaluation of problem-based learning (PBL) in Chung Shan Medical University, Taiwan-a pilot study. *Annals-Academy of Medicine Singapore, 35*(9), 624.

Chng, E., Yew, E., & Schmidt, H. (2011). Effects of tutor-related behaviours on the process of problem-based learning. *Advances in Health Sciences Education, 16*(4), 491–503. doi:10.1007/s10459-011-9282-7.

Collins, A., Brown, J. S., & Newman, S. E. (Eds.). (1989). *Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics*. Hillsdale: Lawrence Erlbaum Associates.

Cornwall, M. (1979). *Students as teachers: peer teaching in higher education*. Amsterdam: Centrum voor Onderoek van Wetenshappelijk Ouderwijs, University of Amsterdam.

Dahlgren, M. A., & Dahlgren, L.-O. (2002). Portraits of PBL: Students' experiences of the characteristics of problem-based learning in physiotherapy, computer engineering and psychology. *Instructional Science, 30*(2), 111–127.

Das, M., Mpofu, D. J. S., Hasan, M. Y., & Stewart, T. S. (2002). Student perceptions of tutor skills in problem-based learning tutorials. *Medical Education, 36*(3), 272–278.

Davis, W. K., Nairn, R., Paine, M. E., Anderson, R. M., & Oh, M. S. (1992). Effects of expert and non-expert facilitators on the small-group process and on student performance. *Academic Medicine, 67*(7), 470–474.

De Grave, W. S., Dolmans, D., & van der Vleuten, C. P. M. (1999). Profiles of effective tutors in problem-based learning: scaffolding student learning. *Medical Education, 33*(12), 901–906.

Des Marchais, J. E., & Black, R. (1991). *Effect of tutor content expertise on student academic achievement in the Sherbrooke problem-based curriculum Sherbrooke*. Québec: Université de Sherbrooke.

Dolmans, D., Gijselaers, W. H., Moust, J. H. C., De Grave, W. S., Wolfhagen, I., & Van der Vleuten, C. P. M. (2002). Trends in research on the tutor in problem-based learning: conclusions and implications for educational practice and research. *Medical Teacher, 24*(2), 173–180.

Dolmans, D. H. J. M., Janssen-Noordman, A., & Wolfhagen, H. A. P. (2006). Can students differentiate between PBL tutors with different tutoring deficiencies? [Article]. *Medical Teacher, 28*(6), 156–161. doi:10.1080/01421590600776545.

Emery, C. R., Kramer, T. R., & Tian, R. G. (2003). Return to academic standards: a critique of student evaluations of teaching effectiveness. *Quality Assurance in Education, 11*(1), 37–46.

Gilkison, A. (2003). Techniques used by 'expert' and 'non-expert' tutors to facilitate problem-based learning tutorials in an undergraduate medical curriculum. *Medical Education, 37*(1), 6–14.

Groves, M., Rego, P., & O'Rourke, P. (2005). Tutoring in problem-based learning medical curricula: the influence of tutor background and style on effectiveness. *BMC Medical Education, 5*, 20.

Henry, H. R., Tawfik, A. A., Jonassen, D. H., Winholtz, R. A., & Khanna, S. (2012). "I Know This is Supposed to be More Like the Real World, But…": Student Perceptions of a PBL Implementation in an Undergraduate Materials Science Course. *Interdisciplinary Journal of Problem-based Learning*, 6(1).

Hmelo, C. E., Gotterer, G. S., & Bransford, J. D. (1997). A theory-driven approach to assessing the cognitive effects of PBL. *Instructional Science, 25*(6), 387–408.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review, 16*(3), 235–266.

Hmelo-Silver, C. E., & Barrows, H. S. (2006). Goals and Strategies of a Problem-based Learning Facilitator. *The Interdisciplinary Journal of Problem-based Learning, 1*(1), 21–39.

Huang, R. (2005). Chinese international students' perceptions of the problem-based learning experience. *Journal of Hospitality, Leisure, Sport and Tourism Education, 4*(2), 36–43.

Kassab, S., Al-Shboul, Q., Abu-Hijleh, M., & Hamdy, H. (2006). Teaching styles of tutors in a problem-based curriculum: students' and tutors' perception. *Medical Teacher, 28*(5), 460–464. doi:10.1080/01421590600627540.

Kaufman, D. M., & Holmes, D. B. (1996). Tutoring in problem-based learning: Perceptions of teachers and students. *Medical Education, 30*(5), 371–377.

Kaufman, D. M., & Holmes, D. B. (1998). The relationship of tutors' content expertise to interventions and perceptions in a PBL medical curriculum. *Medical Education, 32*(3), 255–261.

Kivela, J., & Kivela, R. J. (2005). Student perceptions of an embedded problem-based learning instructional approach in a hospitality undergraduate programme. *International Journal of Hospitality Management, 24*(3), 437–464.

Lea, S. J., Stephenson, D., & Troy, J. (2003). Higher education students' attitudes to student-centred learning: beyond'educational bulimia'? *Studies in Higher Education, 28*(3), 321–334.

Lockspeiser, T. M., O'Sullivan, P., Teherani, A., & Muller, J. (2008). Understanding the experience of being taught by peers: the value of social and cognitive congruence. *Advances in Health Sciences Education, 13*(3), 361–372.

Maudsley, G. (1999). Roles and responsibilities of the problem based learning tutor in the undergraduate medical curriculum. *British Medical Journal, 318*, 657–661.

Mayo, W. P., Donnelly, M. B., & Schwartz, R. W. (1995). Characteristics of the Ideal Problem-Based Learning Tutor in Clinical Medicine. *Evaluation and the Health Professions, 18*(2), 124–136.

Moust, J. H. C., & Schmidt, H. G. (1994). Facilitating Small-Group Learning - a Comparison of Student and Staff Tutors Behavior. *Instructional Science, 22*(4), 287–301.

Orlander, J. D., Gupta, M., Fincke, B. G., Manning, M. E., & Hershman, W. (2000). Co-teaching: a faculty development strategy. *Medical Education, 34*(4), 257–265.

Otani, K., Kim, B., & Cho, J. (2012). Student evaluation of teaching (SET) in higher education: How to use SET more effectively and efficiently in public affairs education. *Journal of Public Affairs Education, 18*(3), 531–544.

Papinczak, T. (2010). An exploration of perceptions of tutor evaluation in problem-based learning tutorials. *Medical Education, 44*(9), 892–899.

Papinczak, T., Tunny, T., & Young, L. (2009). Conducting the symphony: a qualitative study of facilitation in problem-based learning tutorials. *Medical Education, 43*(4), 377–383. doi:10.1111/j.1365-2923.2009.03293.x.

Ryan, G. W., & Bernard, H. R. (2003). *Techniques to identify themes. Field methods, 15*(1), 85–109.

Saye, J. W., & Brush, T. (2002). Scaffolding critical reasoning about history and social Issues in multimedia-supported learning environments. *Educational Technology Research and Development, 50*(3), 77–96.

Schmidt, H. G. (1994). Resolving inconsistencies in tutor expertise research: does lack of structure cause students to seek tutor guidance? *Academic Medicine, 69*(8), 656–662.

Schmidt, H. G., & Moust, J. H. C. (1995). What Makes a Tutor Effective - a Structural-Equations Modeling Approach to Learning in Problem-Based Curricula. *Academic Medicine, 70*(8), 708–714.

Schmidt, H. G., & Moust, J. H. C. (2000). Factors affecting small-group tutorial learning: a review of research. In D. H. Evensen & C. E. Hmelo-Silver (Eds.), *Problem-based learning: A research perspective on learning interactions* (pp. 19–52). Mahwah: Lawrence Erlbaum.

Schmidt, H. G., Vanderarend, A., Moust, J. H. C., Kokx, I., & Boon, L. (1993). Influence of Tutors Subject-Matter Expertise on Student Effort and Achievement in Problem-Based Learning. *Academic Medicine, 68*(10), 784–791.

Silver, M., & Wilkerson, L. A. (1991). Effects of Tutors with Subject Expertise on the Problem-Based Tutorial Process. *Academic Medicine, 66*(5), 298–300.

Stanley, T., & Marsden, S. (2012). Problem-based learning: Does accounting education need it? *Journal of Accounting Education, 30*(3–4), 267–289.

Steinert, Y. (2004). Student perceptions of effective small group teaching. *Medical Education, 38*(3), 286–293.

Swanson, D. B., Stalenhoef-Halling, B. F., & Van der Vleuten, C. P. M. (1990). Effect of tutor characteristics on test performance of students in a problem-based curriculum. In W. Bender, R. J. Hiemstra, A. J. J. A. Scherpbier, & R. P. Zwierstra (Eds.), *Teaching and assessing clinical competence* (pp. 129–134). Groningen: BoekWerk Publications.

Thomas, D. R. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. *American Journal of Evaluation, 27*(2), 237–246.

van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher–student interaction: A decade of research. *Educational Psychology Review, 22*(3), 271–296.

van Wyk, J., & Mclean, M. (2007). Maximizing the value of feedback for individual facilitator and faculty development in a problem-based learning curriculum. *Medical Teacher, 29*(1), e26–e31.

Wetzel, M. S. (1996). Developing the role of the tutor/facilitator. *Postgraduate Medical Journal, 72*, 474–477.

Williams, J., Alwis, W., & Rotgans, J. (2011). Are tutor behaviors in problem-based learning stable? A generalizability study of social congruence, expertise and cognitive congruence. *Advances in Health Sciences Education, 16*(4), 505–515. doi:10.1007/s10459-011-9295-2.

Yee, H. Y., Radhakrishnan, A., & Ponnudurai, G. (2006). Improving PBLs in the International Medical University: defining the'good'PBL facilitator. *Medical Teacher, 28*(6), 558–560.

Yeung, S. (2010). Problem-Based Learning for Promoting Student Learning in High School Geography. *Journal of Geography, 109*(5), 190–200.

Zwaal, W., & Otting, H. (2010). The process of problem-based hospitality management education. *Journal of Hospitality, Leisure, Sport & Tourism Education, 9*(2), 17–30.