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An evaluation of PBL delivery process in the Faculty of Medical Sciences, St. Augustine, and ways forward

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ABSTRACT:

Problem based learning (PBL) in a medical curriculum was started at McMaster University in 1969 and has since grown in popularity across the world. The Faculty of Medical Sciences (FMS) at the St. Augustine campus of the University of the West Indies (UWI) adopted PBL for pre-clinical science and para-clinical science courses since its inception in 1989. The use of PBL promotes self-directed learning, critical thinking, research skills and communication skills of students. In an effort to have sustained improvements of the PBL process at FMS, the Centre for Medical Sciences Education (CMSE) organizes periodic reflective meetings with academic staff to identify weaknesses and holds workshops for remedial measures. Additionally, CMSE has initiated a monitoring process using a checklist developed in-house. The aim of the present study was to evaluate the PBL delivery process for students in years 1, 2 and 3 of a five year medical programme. The study identified several practices of tutors and group leaders that need to be addressed in order to improve the delivery of PBL in the faculty.

Key Words: *Problem-based learning, Self-directed learning, Monitoring process, Medical Curriculum*

Introduction:

During the last few decades, there has been a surge in the use of Problem-based learning (PBL) in health education. Since the adoption of PBL at Mc Master University in 1969 (Neufeld *et al.*, 1989), its acceptance and popularity has been increased multi-fold in the field of medical education across the globe. PBL is a learner-centred approach that revolves around an ill-structured problem or scenario where a small group of students takes part in the learning process actively and independently, applying their prior knowledge and experience to develop new knowledge and skills. The pedagogical appeal of PBL is its perceived capacity to foster, through these learning processes, enhanced clinical reasoning skills, and the development of both an adaptable knowledge base to use in professional settings and the skills in self-directed learning necessary to become lifelong learners in that profession (Kelson and Distlehorst, 2000). In PBL, students identify the issues, frame hypotheses, formulate objectives, do research, and take part in the discussion to resolve the problem as a team. The focus in PBL is learning of the students rather than the teaching by the teachers (Barrett, 2005).

Despite of the wide popularity of PBL in medical schools, its effectiveness continues to be a debatable issue. Whilst several published articles have shown that PBL has succeeded in promoting self-directed learning, critical thinking, communication skills, etc. among students (Prince *et al.* 2005, Tiwari *et al.* 2006, Chakravarthi *et al.* 2010), a number of papers have also demonstrated no significant effect of PBL in improving students' learning (Berkson 1993, Smits *et al.* 2002). The success of a PBL process depends on the commitment and activities of all students (Biley, F. 1999) in a group including group leader, scribe and those of the tutor (Samy, 2005).

The emphasis of PBL is on students' acquisition of the content (*what to learn*) and the process *(how to learn*). How students learn is as important as what they learn, and understanding how they learn can contribute much to improving what they learn (Wilkes and Bligh, 1999). In term of content students are expected to gain adequate knowledge related to the problem. With regard to the PBL delivery process, they are expected to possess various skills, such as application of previous knowledge to achieve new knowledge; problem solving skills; self-directed learning skills; reasoning, collaborative skills and interactive skills for lifelong learning.

Studies have shown that PBL promotes in-depth understanding of content (Hung, Bailey & Jonassen, 2003) but PBL supporters believe that content acquired today may be obsolete tomorrow and since

knowledge is rapidly expanding, no curriculum can fully cover the breadth of any discipline. (Marlowe & Page, 1998). This view is shared by proponents of the process skill curriculum who argue in favour of the importance of the processes of problem-solving, critical thinking and learning to adapt to change. It is therefore important for the students to actively participate in the PBL process to possess various skills necessary for continued medical education.

PBL in Faculty of Medical Sciences, The University of the West Indies, St Augustine

The University of the West Indies (UWI) is the major tertiary level institution in the West Indies and has three physical campuses in Cave Hill Campus, Barbados; Mona Campus, Jamaica , St. Augustine Campus Trinidad and Tobago and an Open Campus. Since the inception of Faculty of Medical Sciences (FMS) at St. Augustine campus, PBL has been the part of curriculum at various schools of Faculty of Medical Sciences (FMS). The practice of PBL in the FMS has promoted self-directed learning developing critical thinking, reasoning, researching and communication skills of the students within the small peer group. FMS embodies a hybrid system comprising two different and distinct teaching methods. One method is PBL whereas the other method comprises the more familiar and traditional didactic approaches (CMSE, 2012).

PBL delivery process at FMS

Students of FMS experience PBL facilitated by well trained and experienced tutors. FMS follows a systematic approach in PBL based on the Maastricht "Seven Jump" approach. CMSE holds workshops for the newly inducted tutors to understand the standard approach of PBL set by FMS and to successfully facilitate the PBL sessions. The PBL steps followed at FMS are:

Step 1: Identification and clarification of unfamiliar words and phrases
Step 2: Problem analysis and Identification of the main issues
Step 3: Hypotheses formulation
Step 4: Identification of student generated learning objectives
Step 5: Self-directed study
Step 6: Problem resolution and knowledge consolidation
Step 7: Application of new knowledge to problem

Steps 1 to 4 are the brainstorming phase of PBL. After framing the learning objectives with the group agreement, students do research for each objective at step 5. Steps 6 and 7 are the follow-up phases where students share the knowledge and information they have gained while doing

research and cite the resources used in obtaining information. At the end of each problem they describe what they have learned from the problem and how this problem can help in the application of new knowledge. (CMSE, 2012)

In the PBL process, small group students (Between 10 to 15) assembles in tutorial groups assisted by one tutor. With the selection of leader and scribe, students are given an ill-structured problem for brain storming and discussion. Students are asked to identify and analyze the problem, and attempt to formulate hypotheses based on their previous knowledge gained from the didactic lectures. The brainstorming session finished after identifying the learning objectives. Students research the learning objectives and gather relevant information from the authentic sources. After one week the group meets in next session to discuss the problem.

Evaluation of PBL at FMS

Educational evaluation is the systematic appraisal of the quality of teaching and learning (Popham, 1993). Maudsley defines Evaluation as "a systematic process that judges the worth of an educational programme via quantitative and/or qualitative data analysis consistent with the evaluation question and aims to improve students' experience and achievements" Traditionally, medical education was primarily concerned with the delivery of knowledge. It is therefore unsurprising that assessment and evaluation tools in this area are well developed. However, over the past decade medical educators have developed various new techniques intended to better assess skills, attitudes, and behavior (Wilkes and Bligh, 1999). At FMS there are various modes of evaluation to assess the effectiveness of PBL. PBL Rating Scale is used by the tutor to assess the performance of students in PBL; evaluation of group performance is done by tutors; evaluation of tutors' tutoring skills is done by students and evaluation of PBL problems is done by tutors. Using various methods of evaluation not only help in measuring the outcomes of students, but also becomes instrumental in improving the PBL delivery system.

Towards improving PBL delivery process at PBL

As learning is a continuous process, we need to examine our teaching –learning strategy at regularly to ensure that it meets the educational needs of the students. Any change in PBL needs to be based on sound rationality and evidence. Over the years we have gain more understanding

about PBL. Even though enough progress has been made in this area, there is still scope for further improvements and refinements.

The Centre for Medical Sciences Education (CMSE) organizes meetings at different point of time inviting the experienced faculty members to deliberate upon the prospects and challenges of PBL. After 25 years of implementation, CMSE invited experienced medical educators in the focus group of discussion to reflect on PBL. An open ended questionnaire was distributed to them asking their views on the progress and challenges of PBL in FMS. Most of the faculty considered PBL as one of the effective approaches of learning and pointed out following advantages:

- Encourages self-directed learning
- Promotes critical thinking and research
- Learning retains for long time
- Helps in developing communication skills
- Promotes peer learning
- Encourages open discussion
- It becomes easier to assess the knowledge, skills and attitudes of students
- Encourages team spirit
- Encourages search for information
- Critical analysis of information which leads to proper diagnosis and prognosis
- Helps students to know the strength and weakness of each other
- Working with peer for problem solving
- Students get acquainted with learning through real life situation
- Students get motivated to learn and actively involved in study

At the same time they were also concerned about some of the challenges that prevailed in the existing PBL process. Students of Year 1 are familiar with traditional methods and feel uncomfortable with a different method. Similarly some tutors are not comfortable with this approach; as a result, they lack commitment in facilitating the group. Another problem discussed in the meeting was diversion in following the standard PBL approach set by FMS. Despite the faculty development programme on PBL every year and the availability of PBL guide some tutors follow their own approach to PBL ignoring the FMS standard approach. The Faculty of Medical Sciences felt it necessary to monitor the effectiveness of PBL delivery process to make sure that all the PBL groups are following the standard approach of PBL developed by the FMS. CMSE was mandated to monitor the PBL process. As a result, a

monitoring process has been started for the PBL sessions by using a PBL process observation form to identify the gaps in PBL delivery system.

The monitoring process was started in Sept 2014 for years 1, 2 & 3 students to bring improvement in the delivery process of PBL:

- To make sure that the FMS standard guidelines are used in PBL sessions
- To ensure that each scheduled PBL session is delivered during the allotted time
- To ensure that each tutor performs his/her role as facilitator
- To monitor that the group leaders, scribes and members work in collaboration

Effectiveness of Monitoring

Literature says that monitoring has positive impact on the performance of the students. Fuchs and Fuchs (1986) did a meta-analysis on the effects of close monitoring of the learning of mildly handicapped students. Those whose programs were systematically monitored and developed formatively achieved an average of 0 .7 standard deviation units higher than those taught without close monitoring or programs which are developed formatively. Ward and Jungbluth (1980) compare the effects of a self-monitoring and self-reinforcement structure with those produced by an external monitoring and reinforcement structure and with the effects of one in which there was no monitoring and rewards were non contingent. One finding was that students who experienced daily monitoring (provided by self or others) outperformed those who were not monitored.

Though PBL approach has been used adopted before two decades in FMS, but the monitoring of PBL delivery process is new of its kind. The present study aims to monitor and evaluate the PBL delivery process in the Faculty of Medical Sciences.

Methodology

Out of 66 groups (Year 1 - 25, Year 2- 22 and Year 3- 21) 24 PBL groups (Year 1- 09, Year 2- 07 & Year 3- 08) were monitored in 2014 -15 by one of the representatives from the CMSE. Out of 24 groups 20 groups were observed completely and 4 groups were observed partially. Group monitoring included observation of tutors, leaders, scribes and other members of the groups. It was a structured observation where the researcher used a PBL observation form, developed in-house, as a checklist to assess the PBL delivery process. The questionnaire consists of 24 items that

relate to tutors, group leaders, scribe, team work and the learning environment. All the items are in five point scale ranging from *Unsatisfactory - 1, Satisfactory -2, Good - 3, Very Good - 4, and Excellent - 5.* All characteristics might not be observable in one PBL session.

Result:

Role of the Tutor

Table 1 reveals that majority of tutors created a comfortable and supportive environment in PBL classes. 95.83% tutors created proper environment for learning whereas 79% tutors encouraged cooperative behavior and 87.5% of them facilitated self-directed learning in the PBL groups. But only 37.5% students encouraged the students, specifically less involved students, to take part in session. Further table 1 shows that 45.83% tutors promote critical thinking, 58.34% guide in framing objectives, 37.5% provide feedback and 41.67% of them asked stimulating questions during brain storming session. When students were out of the track during the session, 75% tutors intervene to move the process smoothly and also the same percentage of tutors facilitate well during PBL delivery process.

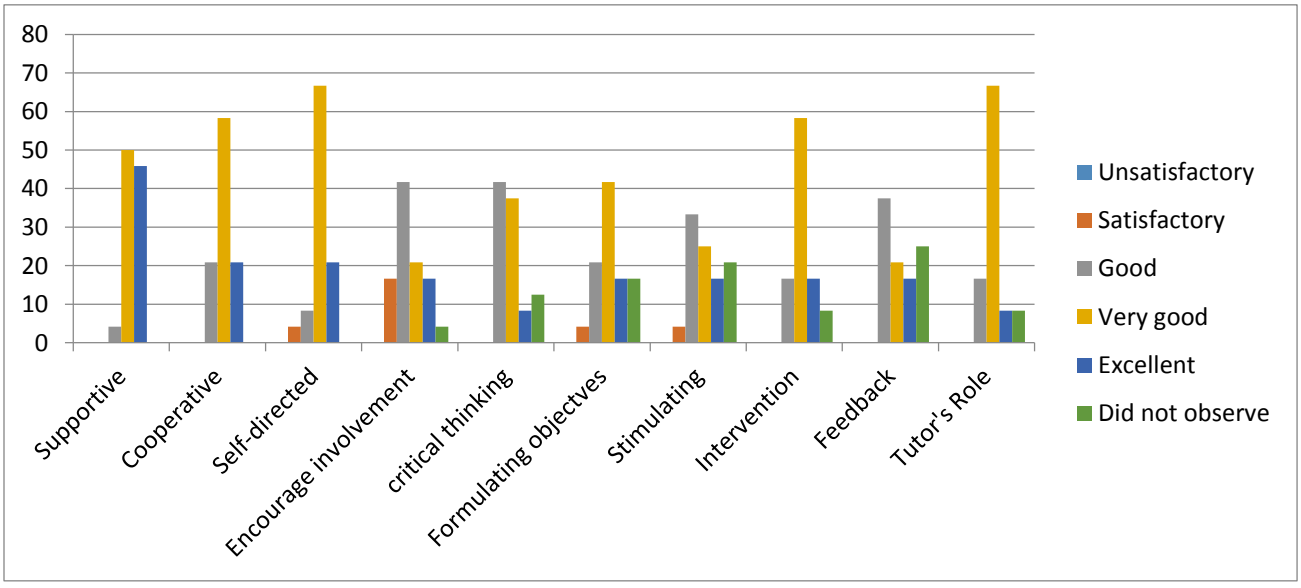

Figure 1

Table 1	*Unsatisfactory*	Satisfactory	Good	Very good	Excellent	Did not observe

Supportive	0	0	4.17	50	45.83	0
Cooperative	0	0	20.83	58.33	20.83	0
Self-directed	0	4.17	8.33	66.67	20.83	0
Encourage involvement	0	16.67	41.67	20.83	16.67	4.17
critical thinking	0	0	41.67	37.5	8.33	12.5
Formulating objectives	0	4.17	20.83	41.67	16.67	16.67
Stimulating	0	4.17	33.33	25	16.67	20.83
Intervention	0	0	16.67	58.33	16.67	8.33
Feedback	0	0	37.5	20.83	16.67	25
Tutor's Role	0	0	16.67	66.67	8.33	8.33

Leader's Role

Table 2 shows that most of the leaders, (91.67%) started the PBL session on time and 70.83% of them allowed the members to express their ideas during the session. However, 19 of them (79.17%) did not ask other members to take part in the process. Only 5 leaders (20.83%) focussed on clarifying the issues during the brain storming session while only 3 leaders (12.5 %) properly summarized the views as discussion was going on.

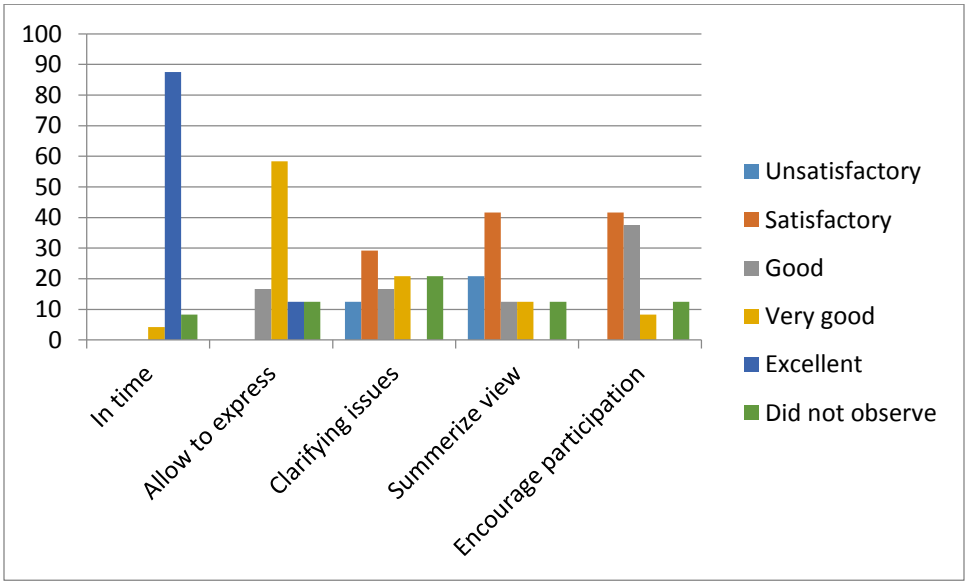

Figure 2 *Unsatisfactory* Satisfactory Good Very good Excellent Did not observe

Table 2

In time	0	0	0	4.17	87.5	8.33
Allow to express	0	0	16.67	58.33	12.5	12.5
Clarifying issues	12.5	29.17	16.67	20.83	0	20.83
Summerize view	20.83	41.67	12.5	12.5	0	12.5
Encourage participation	0	41.67	37.5	8.33	0	12.5

Scribe's Role

Figure 3 reveals that majority of the scribes have noted the issues, hypotheses and objectives properly. Also 66.66% scribes participated in the discussion along with scribing the session.

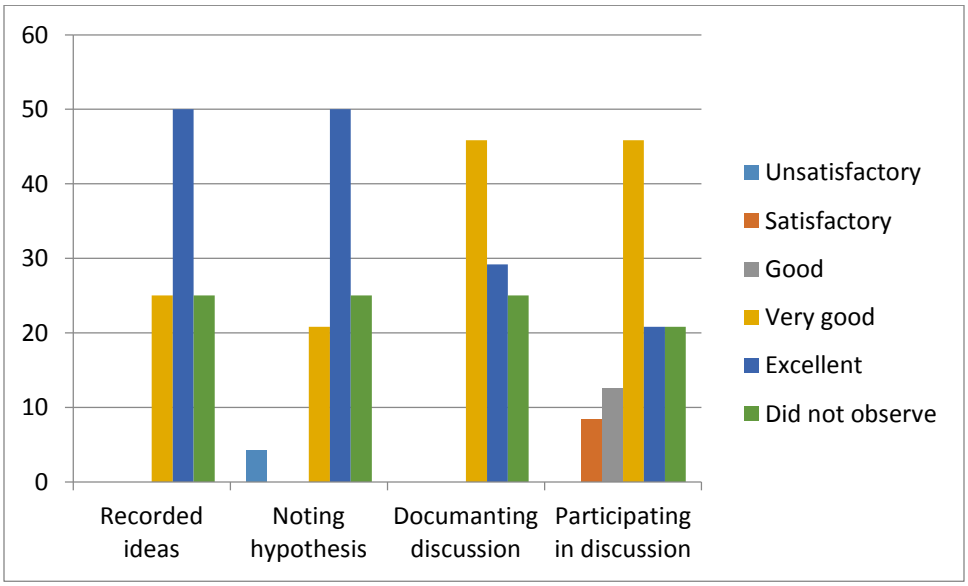

Figure 3

Table 3

	Unsatisfactory	Satisfactory	Good	Very good	Excellent	Did not observe
Recorded ideas	0	0	0	25	50	25
Noting hypothesis	4.17	0	0	20.83	50	25
Documanting discussion	0	0	0	45.83	29.17	25
Participating in	0	8.33	12.5	45.83	20.83	20.83

discussion

Overall Learning Environment

Table 4 shows that 83.34% of the group succeeded in delivering meaningful learning information and skills and 87.4% of the group adhered to the polite norms of spoken communication. However, 41.67% of the group emphasized on equal participation of all the members in the PBL process and only 33.33% group followed the seven steps of PBL. But, in 66.67% group the overall learning environment was very good.

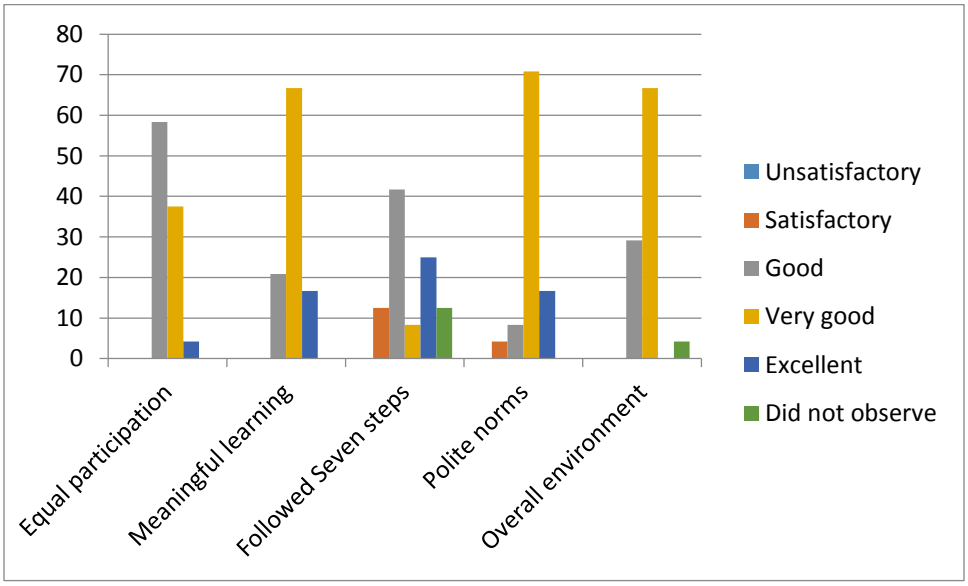

Figure 4

Table 4

	Unsatisfactory	Satisfactory	Good	Very good	Excellent	Did not observe
Equal participation	0	0	58.33	37.5	4.17	0
Meaningful learning	0	0	20.83	66.67	16.67	0
Followed Seven steps	0	12.5	41.67	8.33	25	12.5
Polite norms	0	4.17	8.33	70.83	16.67	0

Overall environment	0	0	29.17	66.67	0	4.17

Discussion

The tutor's role as facilitator is of pivotal importance, as student learning would depend on the facilitator's understanding and appreciating of his/her responsibilities in the small group sessions (Dolmans *et al.*, 1994). Our results reflect that majority of the tutors created a comfortable and supportive environment in their PBL classes. Our tutors were found very much cooperative during the PBL process. One of the essential features of PBL is self-directed learning (Hung, 2009), where students learn independently using their previous knowledge with minimum interference by the tutors. The result reveals that majority of the tutors succeeded in facilitating self-directed learning in the groups. It indicates that the tutors are well known about learning cetntred strategy where due emphasis is given to the learners. The tutors also guided the students in formulating objectives for independent research. A tutor has to be aware of the appropriate time and situation to intervene in the PBL process for successful tutoring (Haith-Cooper, 2003). The PBL tutors at FMS know when and how to intervene and they consider students' learning as their top priority.

There are certain areas where tutor' role is role was quite disappointing. Only 37.5% tutors encouraged students, particularly less involved students, to take part in discussion. This may be due to the confusion of *how to and when to intervene* the group. Similarly, tutors also lacked in promoting critical thinking ability among the students. Feedback is an essential component of learning process. Through feedback, individuals recognize the areas of deficiency in their knowledge or skills and seek to remedy these (Parikh, et al., 2001). But the tutors at FMS have given less priority to provide feedback to the groups.

In PBL, one of the students in the group acts as a leader who plays an important role in the smooth functioning of the PBL delivery process. Our results reveal that majority of the leaders started the PBL session in time. However, the overall role of the leader in many groups was

disappointing. As many as 19 (79.17 %) leaders did not ask other members to take part in the process. It may be because many tutors did not pay attention to the role of the leader and did not give them the opportunity to develop leadership skills.

The scribe is responsible for documenting the contributions made by the students during the PBL session and the result reflects that most of the scribes performed their roles properly. Also majority of the scribes took part in the discussion along with performing their given role. Only 5 scribes (20.83 %) did not participate in the discussion and remained busy in noting down the important points.Two scribes did not write anything on the board. In three classes, there was no scribe. It reflects that some tutors do not feel the significance of scribes' role in PBL.

Our result reflects that majority of students delivered meaningful information and skills during the session. It may be due to the supportive learning environment students of many PBL groups did the research properly and shared their collected information among the group. Most of the group adhered to the polite norms of spoken communication and overall learning environment in most of the groups was very good. However, there was a wide variation in following the FMS standard approach to PBL. Only 8 (33.33%) groups followed the FMS standard approach. In 14 groups (58.33%) equal participation among all the members was not seen. 5 to 6 students in each group were dominating the PBL session.

Conclusion:

The paper describes a tool and a process to monitor the key players at PBL sessions. The study found that most the scribes at the tutorials performed commendably during tutorials. However, in a several groups, the tutors and group leaders did not perform at satisfactory levels. For example, whereas feedback is one of the significant components of the PBL process (AlHaqwi, 2014), a number of tutors did not provide sufficient feedback to the students. It is expected that the information to tutors, students, and administrative heads will lead to corrective measures to improve the delivery of PBL at FMS. It is also anticipated that the information will guide future training sessions for PBL tutors and students.

Limitations and future work

The method of direct observation used for this study has an inherent weakness of observer bias. Future work will investigate whether the monitoring process will improve performance of students.

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