

Students' Rating on Effectiveness of Problem Based Learning and Skills Laboratory Training in the Phase I MBBS Program

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Abstract: Background: This study investigates medical students' level of satisfaction with the effectiveness of PBL and Skills Lab training. It also seeks students' opinions on the duration of the Phase I Programme and whether the pre and para clinical courses appropriately prepare them for ward-readiness. **Method:** An anonymous questionnaire was administered to 4th and 5th year medical students seeking the outcome of a PBL approach, effectiveness of Skill Lab Training and duration of the pre and para-clinical offered in phase I. The collected data was subjected to mean and standard deviation; and percentages were presented in graphs. **Results:** Our results on students' ranking of the effectiveness of PBL reflect a below average rating. Students prefer skills training in both ward and laboratories rather than in skills laboratories only. The study also reveals that the majority of students prefer to have a 2-Year Phase I programme. **Conclusion:** Although PBL is a widely popular approach to teaching, our results show that it is always contextual. It is also observed that students prefer a blended form of skills training. Students' preference of a 2 year Phase I Programme needs to be seriously considered with a paradigm shift from the present curriculum.

Key words: Problem based learning, MBBS, skills training, effectiveness.

1. Introduction

Problem Based Learning (PBL) in medical education was first introduced at McMaster University; Canada in 1969[1]. It has been variously described as a “complex mixture of general teaching philosophy, learning objectives and goals and faculty attitudes and values” [2]. It is also seen as a general learning strategy rather than a mere teaching approach [2]. Experts in the field view PBL as not just a method but as a way of learning and also as simulative, integrated and progressive [3, 4]. In the forty or so years since its introduction there has been continuing concern among medical educators about whether or not to adopt PBL as a teaching/learning approach.

Consistent with medical schools elsewhere, and also in the Caribbean, in 1989 [5], the Faculty of Medical Science (FMS), University of West Indies St. Augustine Campus, adopted an approach in which one third of the teaching time was devoted for PBL to deliver Phase I (First 3 years) MBBS curriculum and more than two decades later (2010), the FMS continues to use PBL as part of its curriculum. In addition, the FMS also offers skills laboratory training during the Phase One so that students might be better equipped with the practical skills necessary for the clinical phase of the program. Of the three years that are devoted for Phase One, the “preclinical” training is done in the first and second, and “Para clinical” training is done in the third year.

Twenty years after implementing PBL, there is now a need to investigate student perceptions of this hybrid PBL approach as well as their opinions of skills

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laboratory training. Researchers at the FMS therefore took the question of level of satisfaction and perception of the effectiveness of PBL directly to the stakeholders, the students. The researchers also asked whether the time allotted for the pre and Para clinical courses was appropriate to prepare students to be ward-ready. This paper details the Years four and five students' levels of satisfaction, with the hybrid PBL approach along with their suggestions on ways to make the programme at the FMS more meaningful.

A large body of published literature exists on the PBL, now promoted as a philosophy of education and an appropriate strategy for professional education [6, 7]. Yet the effectiveness of PBL and the level of satisfaction that medical students who are taught and who learn from this "philosophy of education" is still largely unclear. There is a common perception that assessment drives learning, yet it is strongly believed that since PBL involves learning through handling problems, that the approach acts as a trigger to do so. The educational philosophy behind PBL aims to build self directed learners, to develop positive team behavior, as well as to develop and nurture critical thinking skills among the students. Informed by this philosophy, the major objectives of PBL are therefore to strengthen student's foundational knowledge about basic sciences, to develop critical, problem solving and clinical reasoning skills, to instill independent learning skill and to cultivate effective group behavior [8].

The FMS PBL process follows the steps of the Maastricht 7 Jump Method, outlined below. (Box 1) [9]:

Box 1 Steps in the PBL Process at FMS

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

PBL research studies usually provide information that is neither rigorous nor formal enough to contribute to making evidence based medical decisions. Perhaps this is a reason why medical education scholars are still uncertain whether the PBL approach creates better physicians when compared with traditional learning. Uncertainty also exists as to whether the PBL approach is superior to didactic, basic and clinical teaching.

Implementing PBL is not without challenges. One major challenge is the self directed nature of it. More than one- third of medical educators had a neutral stance on PBL as a student oriented educational approach and the value of PBL students' confidence level while questioning and interacting in the class [10]. Moreover, early in medical training, students remain unclear as to what they need to learn in order to solve the given problem.

Medical educators also remain neutral about whether knowledge is better acquired in a PBL based course rather than on a course based on lectures [10]. Further, there is no evidence that shows how a hybrid curriculum can make better doctors when compared to other methods that are used to train doctors.

According to Norman and Schmidt [11], setting up PBL groups provides students with the opportunity to develop skills but in itself contributes nothing to actually develop either their: problem solving abilities or their group and self directed learning skills. And the desired target goal of skill development is only met when there is a learning cycle of practice and feedback [12]. In short, Kinkade [13] recommends the PBL curriculum should be based on carefully selected and designed problems that demand critical knowledge acquisition, problem solving proficiency, self directed learning strategies and teacher participation skills. Furthermore, Major & Palmer [14] established there was no difference between the knowledge that PBL students and non-PBL students acquire with respect to the medical sciences.

Tan [15] explored students' experiences on the following issues on a 10 point scale with the mean

scores in parantheses reflecting the effectiveness of PBL related issues: I learned much about problem solving process (7.2); I learned to become a more independent learner and self directed learner (6.2); I learned to take different perspectives and to think more deeply (7.2), I learned to access and employ a variety of resources and information (7.0), Through the PBL process I am more prepared and ready to solve more complex and new problems (6.0).

Medical schools are making extensive use of Skill Laboratories and centers that provide an excellent setting for such training [16]. A physician can take effective and timely therapeutic decisions only when he or she has an authentic and accurate diagnosis. Prospective practitioners must be well versed in such skills as history-taking, observation, and physical examinations. For when assessed by simulator performance and immediate post training, skill laboratories are known to lead to improvement in procedural skills [17].

The UWI FMS, realizing the effectiveness of skill training has been offering clinical and practical skills training during Phase I (Years 1-3). But, to what extent is this skill laboratory successful in achieving its objectives in meeting the needs of the graduates? Is the time devoted for the skill training adequate and what, if any, suitable alternatives to this type of training exist? After years of training medical students in necessary skills, it became necessary to investigate the relevance and effectiveness of skills training.

2. Method

An anonymous questionnaire was designed to get students' opinions on their perceptions and levels of satisfaction with 3 years of PBL experience and skills laboratory training, and the duration of Pre & Para clinical programs at FMS. This questionnaire originally contained 16 items, 10 of which were placed on a 7 point semantic differential scale where the respondents rated their agreement or disagreement. Five questions were forced-choice, and one item was

open-ended allowing students to express opinions on pertinent issues relevant to the delivery of Phase: I curriculum. However one forced-choice question was dropped because of ambiguity. The questionnaire was administered to 162 (60.22% of the total 269) year 4 and year 5 clinical students.

Data collected on 7-point semantic differential scale were subjected to the calculation of Mean and SD. The maximum score for each item is 7 and minimum is 1. The higher the mean score, the higher the students' more-positive view becomes on the issue. Data collected on forced choice items were subjected to percentage technique and presented in graphs

Students' opinions on the issues in the open-ended question were collated and organized under three major categories: PBL; skills laboratory training and curriculum in pre and Para clinical years. Relevant excerpts from students' responses to the open-ended question are detailed in the 'discussion' section of this paper.

3. Results

Out of the available 269 (118 Year 4, Female 80 & Male 38, and 151 Year 5, Female 89 & Male 62); 162 (60.22% of the total) year 4 and year 5 participated in the study. Thus the total sample of 162 comprised of 56 (34.6%) year 4 and 106 (65.4%) year 5 students; female students outnumbered male (i.e., 64.2%, n = 104) as shown in the Fig. 1.

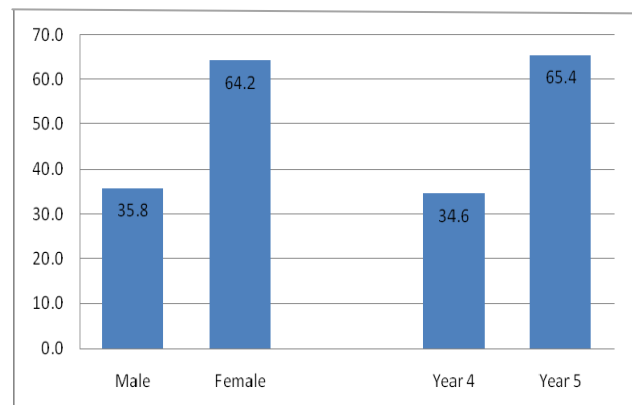


Fig. 1 Characteristics of the selected sample.

From the Table 1 the result shows that the mean score for item no 1, 5, 7 (4.12, 4.91 and 6.23 respectively) only crossed the mid score of 4.

Further as shown in Fig. 2; 128 (79%) students indicate a preference for learning clinical skills using a combined approach (both skill laboratory and clinic).

Particularly for the purpose of history taking 144 (88.9%) (Fig. 3) students prefer to work with real rather than with simulated patients.

As shown in Fig. 4, 96 (59.3%) students are of the view that Pre & Para clinical course materials can be

Table 1 Mean and SD for issues relating to PBL and skills laboratory training

Issues relating to PBL & skill laboratory training	Mean	SD
Q1. Relevance and usefulness of PBL session	4.12	1.51
Q2. Change in learning approach because of PBL	3.89	1.61
Q3. Change in team skills/behaviors because of PBL	3.82	1.58
Q4. Change in cognitive and critical thinking skills because of PBL	3.94	1.45
Q5. Relevance and Usefulness of PBL problem discussed in PBL session	4.91	1.47
Q6. Whether the PBL approach should be abandoned or maintained as it is	3.81	1.57
Q7. Clinical skills can be better learned with real patient in ward or clinic than simulated patient in skills laboratory	6.23	1.37
Q8. Relevance and usefulness skills laboratory training during Pre & Para clinical years	3.77	1.86
Q9. Whether skills laboratory training during Pre & Para clinical years should be abandoned or maintained as it is	3.51	1.70
Q10. By the start of clinical studies; the rating of basic science knowledge	3.93	1.21

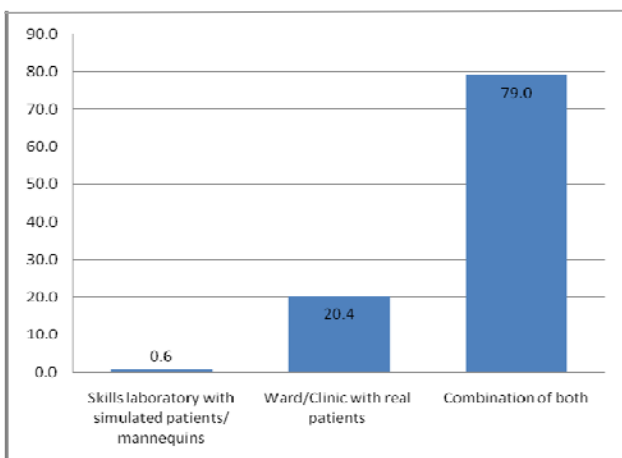


Fig. 2 I could learn clinical skills more effectively in.

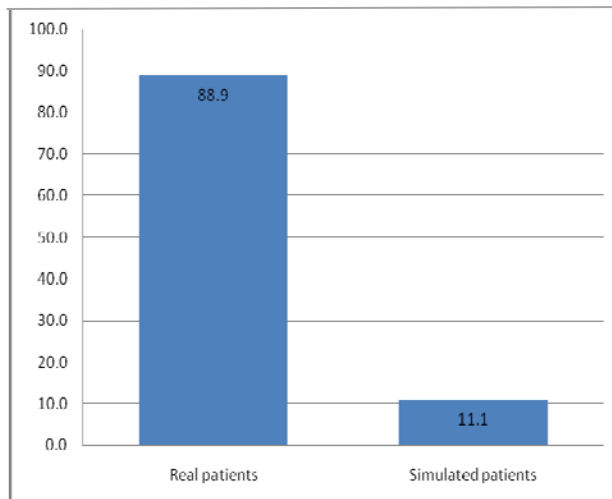


Fig. 3 For the purpose of history taking I prefer to work with.

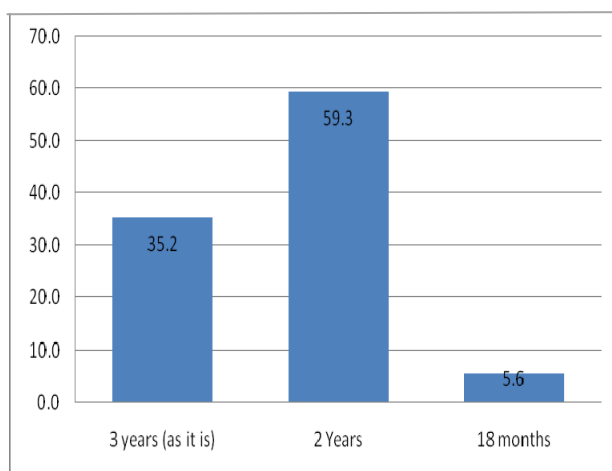


Fig. 4 I could learn Pre & Para clinical materials in.

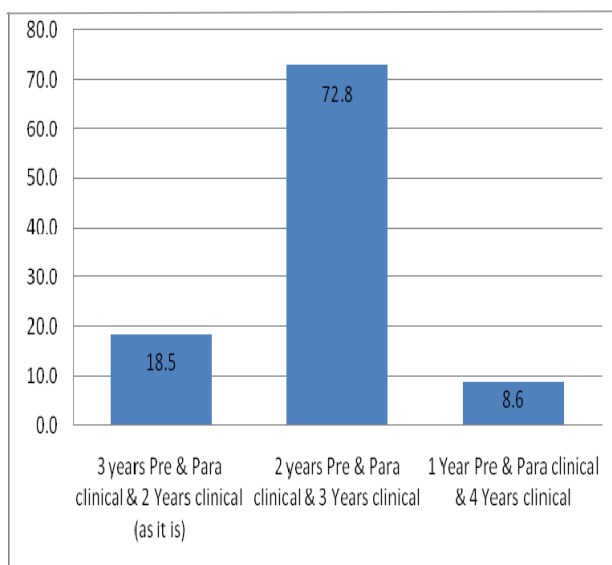


Fig. 5 I would prefer.

covered in a two-year period while only 57 (35.2%) endorsed the current 3 year programme.

Further, a majority of the students 118 (72.8%) (Fig. 5) prefer 2 years of Pre & Para clinical & 3 Years of clinical training.

4. Discussion

4.1 Problem Based Learning (PBL)

PBL training is considered to be able to: (a) develop an effective clinical reasoning process; (b) synthesize knowledge base for use in clinical contexts; (c) develop effective self-directed learning skills; and (d) increase motivation for learning [12]. Contrary to findings from similar studies by Tan [15], our results reflect a negative perception on most features studied. Our students' rating fell below the average on: learning approach, team skills and behavior and also critical thinking skills. This is of serious concern. Even though there is no evidence that a PBL approach provides a better knowledge base, meta-analyses have revealed better socio-cultural attributes and critical thinking, encourage problem solving that promote self directed learning skills in students. The possible reasons for negative perception in our study could be:

(1) PBL methodology in our Hybrid system contributes to less than 10% of the curriculum contact hours.

Students' comments:

(a) The (PBL) curriculum is too time consuming – this wastes time and the schedule only allows time for cramming (b) Too much time is spent on PBL problems (c) We learnt theory in a vacuum for 3 years, unable to relate to real patients...

(2) Large group size, which is usually about twice the number recommended. For PBL teaching it is recommended that no more than 10 students should participate in any one tutorial group [18].

Students' comments:

(a) To some extent PBL helped us to learn about the topic but one lecture with everybody [all students] on the topic would be more efficient way of doing that

because all the critical thinking aspects and team approach doesn't happen."

(3) There is a lack of facilitator training, a lack of interest in the tutors in the PBL process and selection of inappropriate tutors.

Students' comments:

(a) PBL tutors need to be better prepared... some don't even seem to know the material. (b) Tutors should be trained in order to maximally benefit the learning process. (c) Please get lecturers who are dedicated to the task.

(4) Lack of reliable and appropriate assessment method for PBL

(a) PBL is subjective and people [(students)] only go for [(to get)] marks. (b) This is not an equal or fair marking scheme, there should be clinical assessment of the cases. (c) ... fairness in PBL is needed. (d) "I think that PBL is subjective, it depends on the tutor as some give you a really good experience."

(5) Heterogeneity of the student grouping and tutors could result in dysfunctional groups, variability in learning outcomes and unsatisfactory assessment

Students' responses:

(a) Better teachers, more resources and fairness in PBL is [are] needed.

(6) Students can find it frustrating to determine their own learning objectives without proper guidance and can also experience uncertainty on the extent they must study a given topic.

Students' comments:

(a) PBL in year one and up to semester two in year two is a waste with no real direction. (b) "PBL should be revised but maintained... it proved to be very beneficial especially in year three".

(7) Inability to study all the core topics through the PBL process

Students' comments:

(a) Too theory based and not patient oriented (b) Topics should be covered in lectures; students should go back to the ward, check patients and then present in PBL.

Considering various comments by the students, it may be inferred that PBL can be stressful to both students and staff [19].

Although the response is not overwhelming, it is remarkable that students responded positively on the question of relevance of the problem and the usefulness of the PBL session.

Students' comments:

(a) PBL was very helpful, a good learning tool and effective for discussion, but it needs to be reformatted, revised, reduced and restructured.

The problems selected generally included key essential topics that would have relevance to students' assessment and overall learning.

Undoubtedly the increasing adoption of PBL in the medical curriculum even without substantial and robust objective evidence that it is superior to conventional approaches, can be attributed to the strong philosophy, innovation and successful dissemination by the protagonists of PBL who always see the "glass being half full" [10, 20].

The possible reason for our students' overall negative response indicates failure of implementation. This failure could be attributed to a combination of administrative and resource problems such as a lack of understanding and apathy of staff towards PBL. Besides, failure of satisfactory implementation, short-comings and problems inherent to PBL is generally overlooked. PBL classes at FMS are usually large and large-size classes are not recommended for it involves enormous resources and increased heterogeneity.

Another possible reason for our students' responses is the claim that PBL encourages truly self directed learning. This is a myth as in many schools the learning outcomes and objectives are determined by Faculty. The boundary for the breadth and depth of learning outcomes cannot be defined accurately and could lead to confusion [21]. Accurate and reliable tools of assessment for PBL methods are yet to be determined. Our students' responses relevant to their perceptions

that PBL consumes too much time, is disproportionate to the understanding and presentation of a given topic. Further, the results do not reveal overall substantial achievement in cognitive and critical thinking and team skills. Indeed, cultural and social factors, group dynamics and previous learning experiences all play an important role in the PBL process [22].

Collectively, the drawbacks and problems listed above regarding PBL are evident and applicable to our context. The large-class size approximates 400 students in Year I, which results in a burden on infrastructure, resources, and finances and leads ultimately to poor implementation of PBL [23]. Remarkably, few schools adopt Pure PBL as a mode of delivery of the curriculum. Conversely, a significant number of schools adopt hybrid or add variable component of conventional methods. This raises an important question, "If PBL is reforming the teaching-learning in medical schools then why are traditional methods still being used?"

Based on our findings and analysis of existing literature in our context, we state that PBL plays a limited role in our curriculum. We face many challenges in appropriate implementation of PBL and its impact on our system is less than satisfactory. Consequently, we recommend a critical review of PBL in our so called Hybrid model.

4.2 Skills Laboratory Training

The results of our study infer that the students have a preference to learning clinical skills in the real clinical or ward situations rather than in the laboratory. Here are some of their comments: (*Skills lab training should incorporate real life patients so we can understand what clinical signs we would have to look for in particular conditions*). "More time is needed with patients in order for students to be comfortable") our data also emphasize both the skills laboratory training and clinical clerkship would be more effective if combined. "Clinical should be incorporated with Preclinical."

Students felt more time with real patients, smaller groups and close supervision by doctors is necessary to make a meaningful change to their lab experience. (*Smaller skills lab groups with more sessions will be helpful; ... More time needed with patients in order for students to be comfortable with those things that are risky; not everyone had the chance to examine with a doctor's guidance; Skill labs should be more interactive and should tackle a greater variety of technical skills*)

Reasons for implementation of skills training include: to compensate for short period clinical training in the wards and to prepare medical graduates with ability to perform required skills [24]. Students believe that skills laboratory training during early years of pre and paraclinical studies prepares them for their subsequent early clinical clerkship and also builds the bridge and confidence between the two components of clinical skill training. (*Skills lab in the first year should be more clinically oriented and should occur more often. Clinical exposure should ideally start by the second year, if not the first. Clinical exposure enables students to actively learn and gain a greater appreciation for the field of medicine and surgery.*)

Introduction of clinical training in early years would be motivating and would give students a better feel of becoming doctors and also provide scope to integrate Phase One studies with clinical material. Increasing demand of clinical spaces, shortage of quality staff and requirement of uniform structured clinical training and assessment favors rational and balanced use of skills laboratory training along with satisfactory implementation of training in our curriculum. The skills achieved during Skills laboratory should be easily transferable and acceptable in the real clinical setting.

A study by Nielsen et al. indicates improved outcomes in clinical clerkship by those who underwent skills lab training and significant transferability of skills to real patient situations [25]. Students cannot rely on clinical clerkship training alone due to varying work routines [24] and a variation in patient type and

numbers during the year. This results in a lack of uniformity among clinical clerkship groups.

4.3 Duration of Phase I MBBS Programme

Students' preference of having a 2-Year Phase I programme instead of an existing three (3) years is an eye opener. The following students' comments are relevant to duration of the Phase I:

"Pre clinical should be reduced to year one only and Para clinical should be six months to a year".

"If Pre and Para clinical were to be integrated together it would be easier to learn and [should] take two years instead of the three".

Thus Students' preference of a 2 year Phase I Programme needs to be seriously considered with a paradigm shift from the present curriculum.

5. Conclusion

In our hybrid model, PBL contributes to a minor component of teaching learning and assessment. Our students' overall negative perception of PBL warrants a critical analysis and review of status of PBL in our existing curriculum. The problems identified in this study could be attributed to not only unsatisfactory implementation and but also to those inherent to the PBL approach itself. Our results revealed a preference for clinical training in the real clinical situation. However a combined (Hybrid) skills laboratory training and clinical clerkship was considered to be more effective in achieving the desired learning outcomes. We recommend that the role of skills training should be rationalized and balanced in the right context. An urgent evaluation must be made of the suggestion of a paradigm shift towards three years of clinical training. We also recommend a comprehensive review of the curriculum through open debate, referendum and a retreat.

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