

Introduction of Problem-based Learning in a Traditional Medical Curriculum in Singapore—Students' and Tutors' Perspectives

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Abstract

Objectives: The Faculty of Medicine at the National University of Singapore was founded in 1905 and has trained many generations of medical practitioners. Teaching has been based on a traditional British-style curriculum with 2 years of training in the basic clinical sciences and 3 years in the clinical disciplines. Starting in the academic year 1999-2000, a more integrated curriculum was introduced. In conjunction with this, approximately one-fifth of the curriculum time was dedicated to problem-based learning (PBL). This will be the first time that PBL is being implemented in the medical school and both staff and students will be new at it. Thus, the objective of this study was to gather information on the reactions of both staff and students after the actual implementation. **Materials and Methods:** A questionnaire was designed to assess the following: (1) What are tutors' and students' opinions on the relative benefits on students' learning process and participation of PBL versus traditional lectures? (2) What is the level of satisfaction with various aspects of their PBL experience? (3) What were the difficulties that were encountered? **Results:** Several positive and negative aspects of the tutors' and students' experiences were revealed. Most reported fairly high levels of satisfaction with their PBL experience. **Conclusions:** Overall, the experiences have been positive and both groups are willing to "struggle" with this new way of learning.

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Introduction

The National University of Singapore was started in 1905. Since then, it has trained many generations of medical practitioners. The curriculum has been based on the traditional British-style system where the first year is devoted to learning the basic sciences such as Anatomy, Biochemistry and Physiology and the second year to para-clinical subjects such as Microbiology, Pharmacology, Pathology and Family Medicine. The next 3 years are then spent in the clinical departments picking up the necessary clinical skills. Such a system has worked well for many years. The method of delivery of the content has evolved over the years from predominantly lecture-based to the introduction of more small-group learning activities. However, the main complaint from the students has always been that in the first 2 years, much of the content that they are taught seem remote from the practice of medicine. Another major complaint was that the students were being taught too much by the didactic methods resulting in passive students who memorised the information and

regurgitated it at examinations without understanding how the information could be applied in clinical situations.

Materials and Methods

Curriculum Review

Hence in 1997, a committee was set up to review the curriculum. This committee included both pre-clinical and clinical teachers. The committee came up with some specific recommendations that were then discussed at staff retreats chaired by the Dean. The major decisions were to identify a core curriculum, introduce special studies modules to allow students time to pursue interests outside of the core curriculum and a physician-development programme where the students would be introduced to patient care as early as the first year. In addition, it was decided that 20% of curriculum time would be devoted to the use of problem-based learning (PBL) as a method of teaching/learning to encourage the development of self-directed, lifelong learning skills. A recent report from the UK¹ indicated that medical students should be encouraged to be more active

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and to take greater responsibility for their own learning. PBL is one such approach. Thus, several medical schools in the UK have also recently adopted PBL in their undergraduate teaching.

Preparing the Staff and Students

A PBL committee was set up comprising staff from different backgrounds in basic science and clinical practice with varying experience in the use of PBL. An expert from McMaster University was invited to share the experience at McMaster University that has used PBL in medical teaching since 1969.² The PBL committee then ran workshops to familiarise staff with this new methodology. During the workshop the PBL process was discussed. The role of the tutors and the resources available were identified. Staff members were then trained to conduct PBL tutorials and write the problem units to be used for teaching. As this was to be a new experience for the students too, a training workshop was also conducted for the students.

The medical students were then divided into groups of 10 each facilitated by two tutors, a main and a co-tutor. This was adopted as the fastest way to train our staff. During each tutorial, students were exposed to all the steps of the PBL process. In the second semester, we ran the PBL groups with only one tutor each. Printed guides were prepared for both tutors and students. These outlined the PBL process, what was expected of the tutors and students and resources available to learn more about PBL. A webpage was set up with the information as well as feedback forms for both tutors and students.

It was determined that the PBL sessions would be run according to a pre-arranged format. Before the first session of the PBL, all tutors were asked to attend a discussion with the PBL case-writer so that they could clarify the case itself and the objectives of that PBL unit. Then at Session 1, the group did brain-storming and discussed the case that had been presented. Learning issues were identified, assigned to group members and resources were identified. At Session 2, the learning issues were re-visited with input from all students ending with self-evaluation and peer evaluation by both students and tutor(s). During Session 3, the whole class came together with the case-writer for a discussion of the salient points of the problem and to clarify any learning issues that were unclear/ambiguous.

At the end of the first semester, a feedback meeting was conducted by the Dean and PBL committee with the 200 students and 40 staff members at separate times. Questionnaires (Appendix I) were distributed to the students and staff members at these meetings. A total of 138 students and 32 staff members completed the questionnaire.

Results

Tables I and II show the students' response to questions 1 and 2 while Tables III and IV are the tutors' response to questions 1 and 2 respectively.

Both students and tutors rated PBL as more beneficial for the students' interest and enthusiasm, reasoning ability, communication skills and working in small groups (Tables I and III). However, the response with regard to the learning of basic science was that PBL may be less effective than the traditional lectures.

TABLE I: RELATIVE BENEFITS OF PBL AND TRADITIONAL LECTURES ON STUDENTS' LEARNING PROCESS AND PARTICIPATION: STUDENTS' RESPONSE

For each of the following "outcomes", please compare PBL, as you have experienced it this year, with the traditional methods (lectures) using the scale: 1 = traditional much better; 2 = traditional generally better; 3 = both the same; 4 = PBL generally better; 5 = PBL much better

Students (n = 138)	Median
(a) your own interest and enthusiasm	4
(b) your reasoning ability	4
(c) your communication skills	4
(d) your working in small groups	4
(e) the learning of basic science	3

TABLE II: LEVEL OF SATISFACTION WITH THE PBL EXPERIENCE: STUDENTS' RESPONSE

Rate your overall satisfaction with the following aspects of your experience in the PBL sessions using the scale: 1 = very dissatisfied; 2 = dissatisfied; 3 = neutral/no opinion; 4 = satisfied; 5 = very satisfied

Students (n=138)	Median
(a) learning in your group	4
(b) the role you played in your group	4
(c) the tutor's role	4
(d) group support	4

TABLE III: RELATIVE BENEFITS OF PBL AND TRADITIONAL LECTURES ON STUDENTS' LEARNING PROCESS AND PARTICIPATION: TUTORS' RESPONSE

For each of the following "outcomes", please compare PBL, as you have experienced it, with the traditional medical school methods using the scale: 1 = traditional much better; 2 = traditional generally better; 3 = both the same; 4 = PBL generally better; 5 = PBL much better

Tutors (n = 32)	Median
(a) students' interest and enthusiasm	4
(b) students' reasoning ability	4
(c) students' communication skills	4
(d) students' ability to work in small groups	4
(e) the learning of basic science	2

TABLE IV: LEVEL OF SATISFACTION WITH THE PBL EXPERIENCE: TUTORS' RESPONSE

Rate your overall satisfaction with the following aspects of your experience in the PBL sessions using the scale: 1 = very dissatisfied; 2 = dissatisfied; 3 = neutral/no opinion; 4 = satisfied; 5 = very satisfied

Tutors (n = 32)	Median
(a) learning issues raised by students with regard to the objective of the PBL units	4
(b) group dynamics in your group	4
(c) students' interest and enthusiasm	4
(d) the role you played in your group	4

The students were generally quite satisfied with their experience of the PBL sessions (Table II). Similarly, Table IV shows that the tutors were quite happy with their role as facilitators during the PBL sessions.

Discussion

There were several difficulties that were brought up by both the students and tutors.

Physical Resources

The tutors felt that the resources were inadequate as there were some rooms that were not conducive for PBL sessions. These were too small, had poor ventilation and lacked facilities such as comfortable chairs and a round table. These physical limitations were unavoidable as PBL was implemented in such a short time-frame. However, the following year, these rooms were renovated and suitable chairs and tables were made available.

On the other hand, the students were frustrated because there were not enough books in the library when all the groups needed the books at about the same time. This is to be expected as PBL is demanding of resources. However, our librarians were very pleased with this as they see it as the students making full use of the library.

Group Dynamics

Some tutors also felt that the size of the groups (10 students each) was too big as some students ended up discussing in smaller groups among themselves. Some groups also had problems, as some students were more "aggressive" and outspoken than others. The tutors would have to play an important role here in keeping the group running smoothly. Since the problem triggers used in all the sessions are related to patients, some tutors reported that the students became too focused on clinical issues rather than the basic science. Some tutors felt that they had to restrain themselves from telling the students the learning issues, that is, they had to consciously keep themselves from being lecturers. In the tutor-training session, some advice will have to be given on how to address group dynamics issues.

Attitudes

The tutors reported that during the PBL tutorial sessions, the students were initially shy but improved as more sessions were held and they learnt to adapt to being more independent. The students also did not try to use a variety of resources but rather used mainly textbooks. The tutors will have to encourage the students to explore other resources.

Some tutors admitted that not being able to give students the answers was frustrating when the tutor was a non-expert and some were afraid that they did not know enough about the material to guide the students effectively. These emotional responses are a good indication that the tutors are conscious of the new role that they have to play in PBL in being facilitators rather than teachers.

Some of the other problems brought up by the students were a reflection of the confusion associated with a new system. These included discomfort that they had no notes to revise from, that there was too much information, the topics were too advanced and they should be concentrating on the basics only. They reported that they sometimes could not understand everything. Some students felt compelled to say something for the sake of saying it because they were in a small group and felt conspicuous if they kept silent.

Some students wanted more constructive guidelines from their tutor. They were worried about "different versions" of the truth as different groups came up with slightly different conclusions on the learning issues. Thus they would like recommended texts or journals for each learning issue. These concerns reflected the fact that students still wanted to be "taught" and were uncomfortable with the "fuzziness" of learning that they were experiencing through PBL. Similar experiences have been reported elsewhere.³

PBL in the Curriculum

The tutors felt that the assessment questionnaire for the students was too elaborate and took up too much time to fill. This can be easily remedied by redesigning the questionnaire.

The students reported that there was not enough time between Sessions 1 and 2 for them to do their own learning. This time-tabling problem is more noticeable in a "hybrid" curriculum where the students are still attending traditional lectures and tutorials.

The students felt that there was a lack of clear objectives and as a result they did not know the depth to which learning issues should be pursued. The problem writers would need to be clearer about the objectives of each PBL problem. The PBL sessions in Year 1 were largely focused on basic science and so the trigger problems were designed

accordingly. However, the students felt that they would like other aspects (e.g. ethics) to be brought into the discussion.

Conclusion

The confusion prevalent among the students was a reflection of the learning objectives of the PBL cases not being made clear. This led to anxiety as they felt a loss of control over the “content” knowledge they required to score a good mark. This is an old habit that students will have to grow out of.

Overall, this first year’s experience of the Faculty of Medicine is typical of a traditional school that is changing over to the use of PBL in a “hybrid” system that still has elements of more didactic teaching.⁴ However, there are encouraging signs that the students and staff are prepared to “struggle” with PBL as they believe that in the long run, this is the way that they can achieve the goals of self-directed and lifelong learning.

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APPENDIX I

Questionnaire for tutors:

Staff Number : Role : Tutor/Co-tutor* (delete accordingly)

1. For each of the following “outcomes”, please compare PBL, as you have experienced it, with the traditional medical school methods using the scale: 1 = traditional much better; 2 = traditional generally better; 3 = both the same; 4 = PBL generally better; 5 = PBL much better

	1 2 3 4 5
(a) students’ interest and enthusiasm	
(b) students’ reasoning ability	
(c) students’ communication	
(d) students’ ability to work in small groups	
2. Rate your overall satisfaction with the following aspects of your experience in the PBL sessions using the scale: 1 = very dissatisfied; 2 = dissatisfied; 3 = neutral/no opinion; 4 = satisfied; 5 = very satisfied

	1 2 3 4 5
(a) learning issues raised by students with regard to the objectives of the PBL units	
(b) group dynamics in your group	
(c) the role you played in your group	
(d) students’ interest and enthusiasm	
3. What difficulties did you encounter in the PBL sessions?

Questionnaire for students:

1. For each of the following “outcomes”, please compare PBL, as you have experienced it this year, with the traditional methods (lectures) using the scale: 1 = traditional much better; 2 = traditional generally better; 3 = both the same; 4 = PBL generally better; 5 = PBL much better

	1 2 3 4 5
a. your own interest and enthusiasm	
b. your reasoning ability	
c. your communication skills	
d. your working in small groups	
2. Rate your overall satisfaction with the following aspects of your experience in the PBL sessions using the scale: 1 = very dissatisfied; 2 = dissatisfied; 3 = neutral/no opinion; 4 = satisfied; 5 = very satisfied

	1 2 3 4 5
a. learning in your group	
b. the role you played in your group	
c. the tutor’s role	
d. group support	
3. What difficulties did you encounter in the PBL sessions?