

## **Perceptions of Medical Students Undertaking a Problem-Based Learning Curriculum: Experiences during the Pre-Clerkship Phase**

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**Background:** Student's perceptions of pre-clerkship phase concerning their experience of the Problem-Based Learning (PBL) curriculum are variable.

**Objective:** To determine how students in the pre-clerkship phase perceive problem-based learning and the changes in these perceptions with increasing experience.

**Setting:** College of Medicine and Medical Sciences, Arabian Gulf University, Bahrain.

**Method:** Students were interviewed in focus groups and responses were used to develop a structured questionnaire, with 25 sets of questions on five components of the PBL process, which was distributed to 148 students. Response rates were 96%, 76% and 46% for years 2, 3 and 4, respectively.

**Result:** Students perceived PBL as interesting and it develops self-confidence. During tutorials, most of the students were willing to challenge each other but not the tutor. Students preferred discussions with peers to consulting seniors. As the seniority increase, students tended to discuss more during the second tutorial and tended to ask more questions. While preparing for end-of-unit examinations students attempted inter-problem integration less than intra-problem integration.

**Conclusion:** Students perceived PBL as an interesting, though difficult, method of learning, which helps to develop their self-confidence but may result in gaps in their knowledge. The tendency to focus on clinical aspects of a given problem at the expense of its basic science concepts should be discouraged by careful construction of the problems and tutor guides. While students challenge their peers during discussion, all students do not prepare adequately for the second tutorial. Integrated learning can be further enhanced through focusing on the themes identified in the unit booklets and the use of integrated questions on these themes.

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The problem-based learning (PBL) approach practiced at the College of Medicine and Medical Sciences of the Arabian Gulf University (AGU), Kingdom of Bahrain challenges medical students to solve clinical and community problems very early in their training. Evaluation of the curriculum based on student feedback is integral to fine-tuning and improvement of the system.

After completing the pre-medical course in year 1, students enter the pre-clerkship phase, which spans across years 2, 3 and 4. This phase consists of eight units, based predominantly on organ-system blocks; each of which consists of a variable number of problems. In each year, eight or nine students form a tutorial group, which has an assigned tutor who remains with the group throughout the unit. A problem is addressed usually over a period of one week; a few problems extend over two weeks. Each problem consists of a variable number of triggers, which are discussed in the first tutorial of a given week and lead to the identification of learning needs. Students distribute these learning needs among themselves for obtaining the required information from the textbooks, the Internet, disciplinary resource persons, skill laboratories, museum and audio-visual aids. The second tutorial, which is held after a period of four days, commences with discussion of those learning needs on which self-study was undertaken during the preceding four days. It is expected that, through these two tutorial sessions and other activities scheduled within that week, students would acquire the requisite knowledge, skills and attitudes related to structure, function, patho-physiological mechanisms, health assessment, diagnostic reasoning and decision making, ethics and behavior, and community medicine. Their respective tutors evaluate students during the tutorials. At the end of each unit a formal end-of-unit examination is conducted.

It is reasonable to expect that the perceptions of students of PBL change with time and experience<sup>1</sup>. Difference may exist, among years 2, 3 and 4, in the perceptions of the system in general, student and tutor behavior in the first and second tutorials, the nature of self-study between the two tutorials and preparation for examinations.

This study sought the perception of students with PBL, as distinct from their anticipations, which was the focus of our earlier study<sup>2</sup>.

The aim of the study was to identify areas for improvement in implementation of PBL.

## **METHOD**

A modified Delphi technique was adopted for obtaining a feedback from the students<sup>3</sup>. Students in years 2, 3 and 4 were interviewed in their tutorial groups with the help of a pre-determined set of questions to evaluate their perceptions of the pre-clerkship phase. In each year about half the students were interviewed. The students' responses were used to develop a structured questionnaire, which consisted of 25 sets of questions on five components of the PBL process, namely:

1. Perceived advantages and apprehensions of PBL when the students were in year 1 and the manner in which these perceptions have changed over the years and the nature of the orientation program.
2. The processes (including student and tutor behavior) and content emphasis placed in the first tutorial of each week.
3. The nature of self-study undertaken between the two tutorials.
4. The processes in the second tutorial of each week.

5. The manner of preparation for the end-of-unit examination.

Opportunity was provided for open-ended comments at the end of each set, which consisted of 109 questions of varying types: single best response, check list or rating scale. In order to determine the internal consistency of the responses made by each student, some of the questions consisted of opposing pairs, each of which sought the same information but in opposite directions. The two statements in each pair were separated within the questionnaire, in order to make them inconspicuous. The questionnaire was distributed to 148 students in years 2, 3 and 4.

Up to one hour was allowed for completion of the questionnaire under the supervision of at least two researchers, who were available for clarification of any item. Response rates of 96%, 76% and 46% were obtained for years 2, 3 and 4, respectively. Frequency distributions and chi-squared tests to determine the significance of associations between pairs of items were determined using the SPSS PC version 9.

## RESULT

Only 19 out of 25 responses were received. The result is summarized in Table 1.

**Table 1: Percentages of Respondents, in Years 2, 3 and 4, and of All Respondents Respectively, Agreeing with Items in Each of the Five Areas Studied**

Items	Percentages of Students Agreeing with Item			
	Year 2 (N=69)	Year 3 (N=41)	Year 4 (N=39)	Total (N=148)
1. Advantages and Apprehensions				
Having studied in the PBL, system for some time now, what are the advantages of this method of learning for you?				
It is an interesting way to study	80	78	74	78
It is an easier way to study than through lectures	27	34	33	31
It helps to develop my self-confidence	77	78	64	74
As you became more accustomed to the PBL system in what ways have your views of the system changed?				
Less worried and more confident of self-study	51	56	41	50
Increasingly worried about gaps in my knowledge	71	71	77	73
2. The First Tutorial				
In general, estimate the proportion of basic science to clinical aspects that form the focus of discussions:				
• Almost all or more basic science than clinical	41	23	44	37
• Approximately equal proportions	43	30	36	38
• More clinical than basic science	14	43	21	35
Some students do not contribute to forming objectives				
Students are willing to challenge the tutor	61	66	85	69
Students are willing to challenge each other	32	40	33	35
	49	51	59	52

### 3. Preparation between First and Second Tutorial

Do not have enough time to cover all the objectives	79	68	87	78
Consulted senior students for half or more problems	23	15	13	18
Consulted other students in the same year for half or more problems	47	53	31	44

### 4. The Second Tutorial

#### 4.1. The commonest method followed by the tutorial group:

• One student reads from notes, other listen	44	32	31	37
• One student reads from notes, other question	20	22	28	23
• One student reads from notes, others discuss	32	42	31	34

#### 4.2. When students are discussing objectives the tutor:

• Asks questions	40	54	72	57
• Provides explanations only when asked	34	22	28	29
• Provides explanation without being asked	26	29	28	27
• Explains only objectives related to his/ her specialty	21	10	15	17

### 5. Preparation for End-of-Unit Examination

5.1 Never or rarely read the unit booklet	79	83	79	80
5.2. To link knowledge, you:				
• Study related topics from different problems together	44	48	49	46
• Read related material from different subjects together	67	73	74	71

## 1. Advantages and Apprehensions of PBL

A high proportion (78%) of students across the three years considered PBL an interesting way to study. Thirty-one percent perceived this system as easier than lectures. The difference among the three years was insignificant. The majority (74%) of students considered PBL as a factor for developing self-confidence; but the proportion of students in year 4 who thought so was smaller than in the other two years. Students were equivocal about "being more confident of self-study" as they became more accustomed to PBL: 50% agreeing 28% disagreeing and 22% being unsure. The proportion of year 4 students who agreed with the statement "being more confident of self study" (41%) was smaller than in year 2 (51%) and year 3 (56%). The majority of students (73%) were increasingly worried about gaps in their knowledge, year 4 showing the highest proportion (77%).

### 2. The First Tutorial

The majority of students perceived the basic sciences and clinical aspects of a problem to be addressed approximately equally in the first tutorial. Year 2 (41%) and year 4 (44%) students perceived basic sciences as receiving greater emphasis than clinical aspects, while year 3 (43%) students perceived clinical aspects as receiving greater emphasis.

As seniority increased, the perception that "not all students contribute to generating objectives" also increased: 61% of year 2, 66% of year 3 and 85% of year 4 students agreeing with that statement. Fifty-two percent of students in all years perceived that students were willing to challenge each other. Analysis of the responses in each year showed that the

proportion of students who perceived “willingness to challenge each other” increased with seniority (49% in year 2, 51% in year 3 and 59% in year 4).

### 3. Preparation between First and Second Tutorials

The majority of students in each year complained that they did not have enough time to cover all the objectives, with the highest proportion (87%) being in year 4 and less in year 3 (68%). In preparing for the second tutorial, students seem to depend more on their peers (44% consulting peers for more than half the problems) than senior students (18%).

### 4. The Second Tutorial

The common practice followed in the second tutorial was for one student to read from prepared notes. Thirty-four percent of all the students stated this was accompanied by discussion with other students, while 37% stated this was not accompanied by discussion with others. The tendency of other students to ask questions increased marginally as the seniority of the tutorial groups increased.

As student seniority increased their perception about tutors asking them questions also increased (year 2: 40% year 3: 54%, year 4: 72% respectively) Most students stated that, when tutors explained a point, they did not confine themselves to their specialty; only 17% of students stated that tutors confined their explanations to topics related to their own specialty.

### 5. Preparation for the End-of-Unit Examination

Eighty percent of the students overall stated that they never refer to the Unit Booklet or rarely do so when preparing for the end-of-unit examination and this proportion is constant across each year.

Forty percent of students indicated that they studied related topics together. This proportion was constant in each year. On the other hand, a much larger proportion of students (71%) in the three years, study related material from different subjects together, showing the same degree of constancy across each year.

## **DISCUSSION**

The majority of students across the three years of the pre-clerkship phase considered PBL to be an interesting way to study medicine, which is similar to our findings in pre-medical phase students<sup>2</sup>. Students who enter medical school are generally eager to be exposed to the clinical situation as early as possible. The system of PBL practiced at the Arabian Gulf University, while allowing some degree of early clinical exposure in the form of a course on professional skills, allows students to deal with hypothetical cases.

Less than one-third of the students considered this system easier than the didactic system. Higher proportion of students who felt so in year 2 compared to students in subsequent years may be related to experience in the system. This difference is evident despite the fact that problems become increasingly complex as the curriculum progresses.

Another advantage of the system perceived by the majority of the students was the development of self-confidence. The lack of an increasing level of self-confidence with advancing seniority deserves further study, as this is one of the foremost benefits claimed by proponents of PBL<sup>4</sup>. The small proportion of students in year 4 who expressed this as an advantage may be related to a significant change which took place previously where in the interest of promoting the skills of self-directed study, the practice of indicating page numbers in the readings recommended for each problem was discontinued. This may have created a sense of uncertainty for these students as they had hitherto been accustomed to be directed to what they should read. This finding is substantiated by the responses to item 1.4, where a larger proportion of year 4 students than in other years seemed to be more worried and less confident of self-study.

A common complaint of students in PBL curricula is the apprehension that there may be gaps in knowledge, as the problems do not necessarily address all the knowledge and skills they are required to master<sup>5</sup>. This is particularly true in those situations where national examinations are conducted and ranking is an important criterion in the competition for employment. The majority of respondents in the present study expressed the same concern. This concern may also be a reflection of feedback from students in the clerkship phase, who are called upon to apply basic science concepts to the clinical situations they encounter<sup>6</sup>.

The tendency for students to focus primarily on the clinical aspects of a problem has been a source of concern previously<sup>7</sup>. In the first tutorial, the majority of students across all three years perceived the focus on basic sciences to be approximately equal to that on clinical aspects. Large proportion of year 2 and year 4 students felt that basic sciences were dealt with more than clinical aspects, while the reverse was true for students in year 3. Year 2 focuses primarily on concepts and principles pertaining to the basic sciences, while year 4 deals with two systems, the musculo-skeletal and nervous, in which anatomical and physiological concepts predominate. This could account for the opposite finding from year 3, which consists of organ systems such as gastrointestinal, urinary, endocrine and reproductive with more emphasis on clinical content.

The increasing proportion of students who are not contributing to formulating the objectives in the first tutorial as seniority increases is inexplicable, and of concern. A possible reason could be that, as students become increasingly familiar with the PBL system and its novelty wanes, they attempt to take "short-cuts" to solving problems and depend increasingly on lists of objectives made available to them from senior students.

While there was no trend to challenge tutors in the first tutorial, challenging peers increased with seniority. Perhaps students became more confident of themselves as they progressed in the curriculum, and became more familiar with their peers. Tutors for year 4 tend to be drawn primarily from related disciplines. For example, in the musculo-skeletal system they are generally drawn from among anatomists and orthopaedic surgeons. Students reluctance to challenge the tutor may be related to the latter's subject expertise.

A common concern of students was the amount of content to be learnt in relation to the time available to do so. The perception of a heavy study load by year 4 students, may be due to the fact that they have to prepare for a barrier examination which incorporates material learnt across all three years (i.e. years 2, 3 & 4); in addition to the new material (complex problems), they have to learn each week in year 4.

In addition, the units in year 4 are particularly heavy and complex compared to those in year 3. These factors may account for the perception of time inadequacy for preparation particularly in year 4.

PBL as practiced at AGU allows the less industrious students to depend on others for their learning, without contributing as much as they receive. For example, in self-study between two tutorials in a given week, such students may address only the objectives or learning needs assigned to them, or may not prepare at all and depend mainly on learning from their peers. As a result discussion in the second tutorial may be adversely affected since all students do not come to the second tutorial with adequate preparation of all the learning issues to undertake a fruitful discussion. The commonest practice across the three years appears to be for one student to read from prepared notes while others listen. This tendency decreases with increasing seniority and students increasingly questioning the presenting student.

All tutors are inducted to the tutoring process through regular tutor training workshops<sup>8</sup>. However, they are not monitored as they eventually undertake tutoring. Students regularly evaluate their tutors. The fact that neither the evaluator nor the tutor is anonymous may lead to bias in the responses given by the former<sup>9</sup>.

It was, therefore, of interest to obtain students perceptions of tutor behavior in general, rather than of their individual tutors<sup>10</sup>. The most common practice appears to be for tutors to question, rather than provide explanations, but rarely do tutors remain silent. The tendency to ask questions seems to increase as students become more senior. This is to be expected, as many concepts encountered before may re-surface during subsequent problem discussion, and tutors adopt the practice of questioning to encourage students to recall such concepts. Furthermore, as their knowledge increases, students are less likely to be diffident to respond to tutors' questions. When tutors do provide explanation, they do not necessarily confine themselves to their areas of expertise.

Students rarely use the unit booklets in their preparation for end-of-unit examinations was confirmed by this study. Students focus on lists of specific objectives to such an extent that they may fail to see the larger themes within each unit. One of the greatest advantages claimed of PBL is that it encourages integration of learning. While this is logically so, it was interesting to determine whether in fact students undertake integrated learning when they review material in preparation for examinations. The majority of students across the three years stated that they undertake interdisciplinary integration, while smaller proportion undertakes inter-problem integration. A focus on unit themes, in constructing examination questions, would encourage students to study across problems as well.

This study was limited by the low response of year 4 student (49%, n=39). This low response could be due to the questionnaire was distributed to year 4 students a short time before their BSc (final) examination and many students were probably concentrating on preparing for the examination.

## CONCLUSION

**Students perceived PBL as an interesting, though difficult, method of learning, which helps develop their self-confidence but may result in gaps in their knowledge. The tendency to focus on clinical aspects of a given problem at the expense of its basic science concepts should be discouraged by careful construction of problems and tutor guides. While students challenge their peers during discussion, all students do not prepare adequately for the second tutorial.**

**Integrated learning can be further enhanced through encouraging students to focus on the themes identified in the unit booklets and the use of integrated questions on these themes. Pre-clerkship phase students' perceptions of the effectiveness of the PBL curriculum in the Arabian Gulf University are comparable to those of students in other places adopting a similar curriculum<sup>1,4,10</sup>. The findings of present study would help in fine-tuning and further improving implementation of PBL.**

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