Initial Experiences Of Developing An Assessment Scheme For Problem Based Learning Module In An Undergraduate Preclinical Curriculum

**Corresponding Author:**
Dr. Shobha KL,
Professor, Department of Microbiology, Melaka Manipal Medical College (Manipal Campus), Melaka Manipal Medical College, Manipal Campus, Manipal, Karnataka State, 576104 - India

**Submitting Author:**
Dr. Shobha KL,
Professor, Department of Microbiology, Melaka Manipal Medical College (Manipal Campus), Melaka Manipal Medical College, Manipal Campus, Manipal, Karnataka State, 576104 - India

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**Competing Interests:**
No competing interests
Initial Experiences Of Developing An Assessment Scheme For Problem Based Learning Module In An Undergraduate Preclinical Curriculum

Author(s): KL S, Pallath V

Abstract

Background: Problem based learning (PBL) is an instructional method which utilised clinical cases or problems as a context for students learning in basic and clinical medicine. Melaka Manipal medical College has incorporated PBL into its undergraduate medical curriculum. During the process we developed a system to assess the students’ performance during the PBL process. The study was aimed to understand the correlation of this method with other existing assessment methods and its reliability.

Method: The study reports the data generated during the PBL process of september 2006 batch. Students’ performance was assessed using the new assessment method. The marks obtained during the three PBL sessions were analysed for its correlation with other assessment methods. Faculty feedback regarding the assessment system was also taken.

Results: Percentages of students’ who scored above ≥ 4/6 in the brain storming scores increased from the first to the third PBL session (80.4% to 90%) , tutors were satisfied with the students’ performance. PBL evaluation provided a documented feedback to the students on their knowledge, skills (e.g. use of resources, problem analysis and solving) group work skills and attitudes.

Background

Problem based learning (PBL) is an instructional approach that uses problem as a context for students to acquire problem solving skills and knowledge. It embraces principles of effective learning and teaching. It is student directed and fosters intrinsic motivation, promotes active learning, encourages peer teaching, involves timely feed back, and can support student self assessment. The most important function of the assessment process is to enhance student learning. The assessment of students’ performance during the PBL is essential as the assessment is a motivator for learning. The assessment system should be reviewed and sufficient modifications should be placed based on the PBL philosophy at the time of the implementation of curricular reforms like PBL.

Melaka Manipal Medical College (MMMC) offers the Bachelor of Medicine and Bachelor of Surgery (MBBS) program which is a twinning program with Malaysia and India. The program runs in two phases, Phase I and Phase II. Students undergo Phase I training in Manipal, India and it comprises first year (Phase I, Stage I), second year (Phase 1, Stage II A) and six months of clinical training (Phase 1, Stage II B). Phase II component comprises clinical subjects which are taught in Malaysia. About 98% of the students are Malaysian citizens and the rest constituted from different parts of the world.

The curriculum of each year of stage I is divided into four blocks, approximately each block of 10 week’s duration. The content coverage in each block consists of:

Block I - Basic concepts and immunity
Block II – Central nervous system, special senses, skin, muscles, bones and joints
Block III- Gastrointestinal, cardiovascular and respiratory system
Block IV- Endocrine, reproduction, Kidney and electrolytes

MMMC has adopted a hybrid curriculum including instructional methodologies like PBL, self directed learning strategies and didactic lectures. To implement PBL sessions, it became imperative to develop an assessment system used by the tutors, to assess students’ performance. Assessment system included range of competencies and functions like group dynamics, active participation in a group task, presentation skills, and the mastery of the subject. The aim of this study was to analyze the effectiveness of the assessment system in evaluating the students’ performance during the PBL sessions, to check the reliability of the assessment system, to study the correlation of PBL assessment system with other assessment methodologies of the same batch of students and to ascertain faculty perceptions regarding the assessment system.

Materials and Methods
Results

Percentages of students’ who scored above 4/6 in the brainstorming scores increased from the first to the third PBL session (80.4% to 90%), which indicates the improvement in understanding the process of PBL. Percentage of students who scored above 4/6 in communication and presentation skills scores increased from 85 to 94% and in content scores, which indicate the active learning component, increased from 85.9% to 92.5%. Overall, tutors were satisfied with the students’ performance. The frequencies of the scores obtained by the students in different blocks were represented in the illustrations (1-4). Faculty perceptions regarding the PBL evaluation scheme was shown in illustration 5. The PBL scores correlated moderately and significantly with other assessment schemes illustration 6.

Discussion and Conclusion

Evidences have made the statement ‘assessment drives learning’ into a principle in education and it is well known that assessment influences student learning behavior. It is also evidenced by many researchers that no one assessment system can be ideal and each one has its own inherent deficiencies. So student evaluation will require the use of multiple complementary instruments.3 Tutors role is pivotal in conduction of PBL process. The role of the tutor is important in fostering the self directed learning activities students perform during a PBL process.4-6

The assessment system has to be aligned to the objectives and teaching learning activities performed during an educational activity. PBL is one of the most constructively aligned methods of active learning.7

The brainstorming session of the PBL process revolves around various aspects of team work and critical analysis of problem. The students scoring more than 60% marks in the assessment of brainstorming session from the PBL in block I through the PBL in block IV (Illustration 1) had increased, indicated an improvement in ability to propose the hypotheses, identification of learning objectives, and moreover a constructive thinking process. This also indicated more familiarity with the PBL process. The improvement in the active participation score indicated an
improvement in group dynamics, demonstrating a view point to others in the group, providing constructive feedback (illustration 2). Presentation scores indicated the students’ improvement in communication skills and their effective use of visual aids. The improvement in content scores indicated the improvement in the active learning among the students by effectively utilizing the relevant resource materials, sharing and understanding them among the peers.

As per the opinion of the faculty the method was easy to use and it was possible to carefully listen and evaluate the students using this assessment method. They had opined that they do not have difficulty in facilitating the PBL process as they were performing the assessment through this method. At the same time the faculty perceptions on the reliability of this system and it being a complete valuation process were low. (illustration 5). The feedback showed that the criteria for differentiating students’ performance were not clear for many faculty members. This made us look into the guidelines of assessment and restructuring of the criteria.

In similarity to other reported studies (Dodds etal, 2001) 8, there was moderate and significant correlation between scores of other assessment modalities during the continuous assessment in each subject and PBL scores. (illustration 6). This shows that our PBL assessment system seems to give neither advantage nor disadvantage to the students’ in scoring, and complements the other assessment modalities already in use.

PBL evaluation provided a documented feedback to the students on their knowledge, skills (e.g. use of resources, problem analysis and solving) group work skills and attitudes (e.g. independence, respect for the contribution of others, leadership and self reflection).

References

1. Davis M H and Harden R M. An extended summary of AMEE Medical Education Guide No 15. Medical Teacher 1998; 20:2, 317-322
Illustrations

Illustration 1

PBL Illustrations

Illustration 1: Frequency of scores obtained by the students in the brainstorming session

Illustration 2: Frequency of scores obtained by the students in the active participation component of the presentation session
Illustration 3: Frequency of scores obtained by the students in the presentation component of the presentation session
Illustration 4: Frequency of scores obtained by the students in the content component of the presentation session
Illustration 5: Mean values of faculty perceptions regarding the PBL evaluation scheme. (The error bars represent the standard deviation)
Illustration 6 : Results of correlation analysis of PBL and individual subject continuous assessment scores

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<th>Pathology</th>
<th>Pharmacology</th>
<th>Microbiology</th>
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<tbody>
<tr>
<td>PBL 1</td>
<td>Correlation coefficient</td>
<td>0.332</td>
<td>0.407</td>
</tr>
<tr>
<td></td>
<td>p value</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>PBL 2</td>
<td>Correlation coefficient</td>
<td>0.650</td>
<td>0.594</td>
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<td></td>
<td>p value</td>
<td>0.000</td>
<td>0.000</td>
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<tr>
<td>PBL 4</td>
<td>Correlation coefficient</td>
<td>0.526</td>
<td>0.568</td>
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<td></td>
<td>p value</td>
<td>0.000</td>
<td>0.000</td>
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</tbody>
</table>

Appendix (Given to faculty)

This questionnaire will be used to understand your perception towards the PBL evaluation method used in your department. Please indicate whether you Strongly Agree, Agree, Uncertain, Disagree or Strongly Disagree with the statements below. Please be aware that, by agreeing to do so, you are providing us your consent in participating in this study. Your answer will be kept strictly confidential.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The assessment process is time consuming</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. I am able to carefully listen and attend to students’ activities and assess at the same time</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. The criteria for differentiating between the grades are clearly defined</td>
<td></td>
<td></td>
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</tbody>
</table>
7. It is difficult for me to differentiate between the grades (excellent, distinction, honors etc)

8. I am able to evaluate the brainstorming sessions effectively using this method

9. This method is effective in assessing the professionalism in students

10. Is a complete (360°) evaluation the students’ performance in PBL

11. This assessment method is helpful in providing effective feedback to the students

12. The assessment pattern has high reliability

13. I do not have difficulty in facilitating the learning process when I am performing the evaluation by this method

14. This assessment system brings out an unbiased evaluation

15. Assessment system helps the tutor to create a positive learning climate

16. Assessment system helps in the evaluation of PBL process

Any additional comment / suggestion / feedback on the present evaluation:
Thank you for the co-operation
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Reviews

Review 1

Review Title: Initial Experiences of developing an assessment scheme for PBL

Posted by Mr. Anand Kukkamalla on 03 Feb 2011 04:31:09 AM GMT

<table>
<thead>
<tr>
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<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>1</td>
<td>Is the subject of the article within the scope of the subject category?</td>
<td>Yes</td>
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<tr>
<td>2</td>
<td>Are the interpretations / conclusions sound and justified by the data?</td>
<td>Yes</td>
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<tr>
<td>3</td>
<td>Is this a new and original contribution?</td>
<td>No</td>
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<td>4</td>
<td>Does this paper exemplify an awareness of other research on the topic?</td>
<td>Yes</td>
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<tr>
<td>5</td>
<td>Are structure and length satisfactory?</td>
<td>Yes</td>
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<tr>
<td>6</td>
<td>Can you suggest brief additions or amendments or an introductory statement that will increase the value of this paper for an international audience?</td>
<td>No</td>
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<tr>
<td>7</td>
<td>Can you suggest any reductions in the paper, or deletions of parts?</td>
<td>No</td>
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<td>8</td>
<td>Is the quality of the diction satisfactory?</td>
<td>Yes</td>
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<tr>
<td>9</td>
<td>Are the illustrations and tables necessary and acceptable?</td>
<td>Yes</td>
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<tr>
<td>10</td>
<td>Are the references adequate and are they all necessary?</td>
<td>Yes</td>
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<tr>
<td>11</td>
<td>Are the keywords and abstract or summary informative?</td>
<td>Yes</td>
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Rating: 6

Comment:
Dr. Shobha's article on developing an assessment scheme for PBL performance and its correlation with other assessment system is a very important issue in PBL process especially during the brainstorming as well as the presentation sessions. The paper is well written, methodical, systematic and organised with a clear mention of the process and its outcome.

The skills assessed in the PBL and the skills assessed in other forms of assessment (short essay and MTF) are slightly different. Hence, correlation between these two is slightly difficult. One is a summative assessment and the other is formative.

Suggestions:

There are some typographical (spelling) mistakes and a minor change in the graphs is suggested. The parameters (titles) on the X and Y axes are not mentioned.

Competing interests: NO

Invited by the author to make a review on this article? : Yes

Experience and credentials in the specific area of science:
I am actively involved in teaching Medical Microbiology and also research in Medical Education. I have published papers on SDLs, Pathways MCQs as a strategy for learning and also designing problems for PBL sessions. I am currently working on a FAIMER fellowship project on enhancing facilitation skills among PBL tutors. I have been actively involved in the PBL process and curriculum at our institution from the time of its inception contributing in framing and analyzing problems (triggers), assessment of students performance and periodic review of the curriculum.

Publications in the same or a related area of science: No

How to cite: Kukkamalla A. Initial Experiences of developing an assessment scheme for PBL[Review of the
article 'Initial Experiences Of Developing An Assessment Scheme For Problem Based Learning Module In An Undergraduate Preclinical Curriculum' by J. WebmedCentral 1970;2(2):REVIEW_REF_NUM434
Review 2

Review Title: The relevance of problem based process assessment scoring.
(comment and review of the article: Initial Experiences of Developing an Assessment Scheme for Problem Based Learning Module in an Undergraduate Preclinical Curriculum)

Posted by Prof. Jeanne Adiwinata Pawitan on 20 Jan 2011 04:01:47 AM GMT

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<tr>
<td>1</td>
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Rating: 3

Comment:
The article by Shobha et al aimed to show the correlation of the assessment of problem based learning (PBL) module with other existing assessment methods and its reliability. The assessment in problem based learning consisted of: assessment of brainstorming, presentation, participation, and content coverage based on the objectives, while the other assessment methods that were compared to problem based learning assessment were short essay and multiple true false questions [1].

Problem based learning assessment is an assessment of the process of gaining the knowledge, while the other assessments are summative assessments to assess the knowledge. They are complementary, and the moderate and significant correlation between them [1] may be interpreted as moderate and significant correlation between the process and the outcome. However, it is not clear, whether the scores from the PBL assessments (process scores) were higher or lower compared to the scores from short essay and multiple true false questions (exam scores), as the illustration-6 that should show the correlation between process and exam scores is not accessible. Our early experience showed that process scores were higher compared to exam scores, and this fact made most of the students could pass the module, as their module final scores that were calculated using the process and exam scores were higher than the passing grade.

In the problem based learning student seriousness is very important [2], as students should assume responsibility for their own learning and gain the most of knowledge by themselves and by active learning [3]. However, our own early experience in problem based learning that started in 2005 [4] showed that process scoring made the students active in discussions, but many of the students were not serious in searching of required information [5]. The reason was the problem based learning assessment methods that mainly scored the process. The same as the scoring by Shobha et al [1], we also only gave one score for the assessment of content coverage [5], and the students knew about the scoring system that mainly scored the process.
Moreover, assessment of content coverage is not an easy task. The opposite to Shobha et al findings that showed no difficulties in process scoring [1], my own experiences as a tutor in many modules revealed difficulties when I had to score content coverage of the subjects that are not my expertise. Though we got a list of objectives, difficulties arose as we were not sure whether the objective was sufficiently addressed, and we did not know for sure, until how far and how deep they should go. Ideally, if a tutor should give a score for content coverage, the tutor should be a subject expert. However, to use subject experts as tutors is almost impossible, as there are more than 150 students per year, and every discussion covers a lot of topics from a lot of disciplines. Ideally, the tutors that facilitate the process should get refreshing about the content and how deep is the minimal requirement of knowledge that the students have to know.

In the Faculty of Medicine University of Indonesia, refreshing trainings are not feasible. Therefore, scoring for content coverage may result in bias. The article by Shobha et al gave trainings to tutors to facilitate the PBL process and the use of assessment system [1], but it is not clear, whether the trainings also included refreshing about the subjects that were listed in the objectives, and how deep was the minimal requirement of every subject. Further, from the materials and method section, it is not clear whether the process scores play a role in the passing judgment, though from discussion section that mentioned: “give neither advantage nor disadvantage to the students” can be interpreted that process scores played a role in the final score of the module [1]. When the process scores really measure the content coverage and play a role in the final score, I believe that the students will take it seriously, and perform better in discussions.

In conclusion, process scoring is relevant in making the student to be more active in discussions, but when content coverage is not stressed, process scoring can not guarantee that the students will be serious in the collecting of required knowledge. Therefore, ideally, process scores are included in the computation of final score, but the proportion should not be too high.

References


3 Neo WKL. Jump start authentic problem-based learning. Singapore: Prentice Hall; 2004


NB: Point 10. Most references of the article are old (not up to adte).

Competing interests: none declared

Invited by the author to make a review on this article? : No

Experience and credentials in the specific area of science:
I am involved in developing of modules for problem based learning, resource person, lecturer and facsilitator in
PBL, and also doing research in Medical education,

Publications in the same or a related area of science: Yes

References: Pawitan JA. Pembelajaran berdasarkan masalah (problem based learning): haruskah bersamaan
dengan integrasi vertical?[Problem based learning: should it be applied with vertical integration?] (Article in
in lectures and student knowledge gain in problem based learning: experience in Neuropsychiatry module, FMUI,

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review of the article: Initial Experiences of Developing an Assessment Scheme for Problem Based Learning
Module in an Undergraduate Preclinical Curriculum)[Review of the article 'Initial Experiences Of Developing An
Assessment Scheme For Problem Based Learning Module In An Undergraduate Preclinical Curriculum ' by
webmedcentral 1970;2(1):REVIEW_REF_NUM391
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