*Recent Research in Science and Technology 2011, 3(10): 40-42*
*ISSN: 2076-5061*
*www.scholarjournals.org*

www.recent-science.com

RRST-Health Sciences

# Can Rubrics Facilitate Student Assessment in Problem Based Learning?

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Article Info

Article History

*Received : 11-05-2011*
*Revised : 17-07-2011*
*Accepted : 17-07-2011*

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Abstract

The study describes the need to have a systematic, at the same time "fit for purpose" rubric that will enable faculty/tutors to assess students' performance constructively and reliably in Problem-Based Learning (PBL). A four-level assessment rubric having ten- performance objects with descriptors, five each for the two sessions of PBL was developed. Faculty and student feedback in the form of questionnaire was taken to evaluate the process. 81% of faculty reported that the rubric was useful in assessing students and 91% of students felt that it was "very important" that faculty should use the rubric as it reflected authenticity in assesment.

Key Words: Problem-based Learning, Assessment , Rubrics, medical school

## Introduction

Problem-Based Learning (PBL) was introduced as part of the curriculum since 2007 admissions at the Melaka Manipal Medical College (MMMC), Manipal Campus, as part of the curricular reforms. PBL at MMMC, is organized in such a way that faculty designs the problem and given to groups of students (10 to 12 in a group) who start discussing about the problem in a first session namely, brainstorming session. The students explore the learning objectives and meet again after a week of researching on the problem, and make their presentations in the second session called the presentation session. The faculty/tutors assess students in the two sessions of Problem-based Learning.

In order to make assessment of students more authentic, faculty designed rubrics that could assess students' performance constructively in the two sessions.

The study was undertaken with the objective of

1. Developing rubrics that can assess individual achievement in the group process.

2. To determine whether the rubric assesses student performance objectively and efficiently in PBL.

## Methodology

The template/ basic grid was taken from web-based rubrics. It was improved upon and developed by discussions and personal interviews with faculty experienced in PBL. This was modified to "fit for purpose" rubric with academic literature review [1,2] and further developed, keeping in mind the objectives of the Problem-Based Learning sessions and the expectations. Relevant staged criteria to assess student performances in the two sessions namely the brain storming session and presentations were used. The rubric was reviewed by faculty and student inputs. The rubrics were administered to 12 groups of students, in year 1 and year 2, and their respective tutors. The evaluation of this intervention was done by using a pre-post questionnaire which was administered to faculty and students.

## Results

A four-level assessment rubric having ten performance objects with descriptors, five each for the two sessions (brainstorming and presentation) of Problem-Based Learning was developed (Table 1 and Table 2 respectively) . So the total points possible will be 4x 10=40. The performance objects for the first session which is the brainstorming session, include clarification of new terms and unknowns, key issues and finding essential core of the problem, formulating learning objects, participation in discussion and time management. The performance objects for the second session namely, the presentation session include organization of content, knowledge of the subjects, delivery, comprehension and time management. The responses to the pre-post questionnaire that were collected from students and faculty. 81% of faculty reported that the rubric was useful in assessing students. 17% of the faculty felt that some problems did not give scope for assessing few components of the rubric. (For ex.: In the brainstorming rubric, as there will be only a few new terms, the other students will not get a chance to clarify the terms. In the presentation rubric, students may not all get a chance to come up with concept maps or flow charts, so some objectivity is lost in such cases). The majority of students (91%) thought it "very important" that faculty should use the rubric as there was less scope for bias.

Table 1: Brainstorming rubric

| | Performance objects | Level of Competency (Scale 4 to 1) | | | | |
|---|---|---|---|---|---|---|
| | | Highly competent | Medium competency | Low competency | Not competent | Score |
| Session 1 (Brainstorming) Maximum points possible: 20 | Clarification of new terms and unknowns | Clearly and consistently finds terms and unknowns, knows how to initiate and does it; volunteers to help others | Does a good share of finding terms and unknowns, does work when his/her turn comes | Finds very few terms and unknowns and needs some prompting | Does not contribute. Always needs help. | |
| | Key issues, Essential core of the problem | Always applies previous knowledge and relates to previous experiences, by elaboration, restructuring and organisation of information | Applies previous knowledge and experiences | Applies some knowledge but not very confidently | Does not contibute with previous knowledge | |
| | Formulating learning objects | Generates hypothesis , identifies key concepts, contributes with a conscious effort to benefit the group and himself. Considers critically the information brought out by others | Contributes ideas and listens to others, allowing others to participate | Contributes few ideas , carefully listens to others' views and comments | Does not contribute to hypothesis generation and does not identify key concepts | |
| | Participation in discussion | Participates by providing many good ideas ; inspires others; clearly communicates ideas, shows intrinsic motivation contributes to others views. | Participates in discussions, communicates ideas shows motivation | Listens mainly; on some occasions, makes suggestions. | Lists very few; rarely speaks up, and ideas are off the mark. | |
| | Time management | Comes up with problem solving skills instantly | Manages to exhibit some skills | Takes a long time | Does not manage time | |
| Total Score | | | | | | |

Table 2: Presentation rubric

| | Performance objects | Level of Competency (Scale 4 to 1) | | | | |
|---|---|---|---|---|---|---|
| | | Highly competent | Medium competency | Low competency | Not competent | Score |
| Session 2 (Presentation) Maximum points possible: 20 | Organization | Has reevaluated and applied new knowledge to the problem, by filling the gap in knowledge | Has applied new knowledge to the problem | Has learnt the objectives | Has only a vague idea of what is to be learnt | |
| | Knowledge | Has a good knowledge of the subject content, Has referenced latest information in addition | Has a good knowledge of the content in the text book | Has studied important points | Has not understood the text | |
| | Delivery | Uses charts, diagrams, concept maps to share knowledge | Uses diagrams in the text book | Rarely uses diagrams, concept maps | Never uses diagrams, concept maps | |
| | Comprehension | Discusses, Gives feedback, Summarizes information meticulously, and Questions other members | Discusses and gives a summary | Summarizes | Does not summarize or give feedback | |
| | Time management | Brilliantly incorporated content | Manages to incorporate content | Few points left out | Does not manage time | |
| Total Score | | | | | | |

## Discussion

Assessment is an ongoing process aimed at understanding and improving student learning. It involves making our expectations explicit and public; setting appropriate criteria and high standards for learning quality; systematically gathering, analyzing, and interpreting evidence to determine how well performance matches those expectations and standards; and using the resulting information to document, explain, and improve performance. Rubrics seem to have the potential of promoting learning and/or improve instruction. The main reason for this potential lies in the fact that rubrics make expectations and criteria explicit, which also facilitates feedback and self-assessment. It has been suggested in literature that, with team-taught courses or multiple sections of the same course, rubrics can be used to make faculty standards explicit to one another, and to calibrate subsequent expectations [3].

Rubrics instigate a powerful consideration of one's values and expectations for student learning, and the extent to which these expectations are reflected in actual classroom practices. In the present study, rubrics encouraged reflective practice on the part of both students and teachers. When the rubrics were used in the context of students' peer review of their own work or that of others, it enabled the development of their ability to become self-directed learners , and helped them to develop insight into how they and others learned [4].

It was suggested by the faculty that the rubric can be made more powerful when both tutors and students get involved in developing the rubric being used. Several benefits of using rubrics in performance assessments include increased consistency of scoring, the possibility to facilitate valid judgment of complex competencies, and promotion of learning. According to Huba and Freed [5] rubrics assist students by offering clear criteria that can guide students in the development, revision, and evaluation of their own work, a process that is particularly useful when solving open-ended problems in the PBL environment.

The rubric approach to assessment provided a more honest and accurate response from faculty; and students accepted it. In addition, rubrics provided useful formative assessment feedback in a timely manner, so that students could benefit from it as the course progressed.

## Conclusion

While the faculty at the Melaka Manipal Medical College, Manipal Campus, have been comfortable using the rubrics during Problem-Based Learning sessions, it has also helped

students in receiving constructive feedback. The pre-post test questionnaire describing the usefulness of the rubric was distributed to students and faculty. Their responses were encouraging as they found the rubric assisting them in performing better in the PBL sessions. The rubric used in the present study enabled faculty to recognize strengths and weaknesses of students during formative assessment and the same rubric can help the student for his/her self-assessment.

## Acknowledgments

The authors would like to thank the faculty and students of MMMC, Manipal Campus for their participation in the study and for providing useful insights into the development of the rubric.

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