

## Opinions of Tutors and Students about Effectiveness of PBL in Dokuz Eylul University School of Medicine

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**Abstract: Introduction:** The aim of this study is to determine the opinions of tutors and students about the effectiveness of Problem-based Learning in Dokuz Eylul University School of Medicine. **Methods:** A questionnaire with a five-point Likert scale, with 1:minimum, 5;maximum, rating PBL effectiveness was administered in February and March of 2001 to tutors and students. Response rates of tutors and students were respectively 65.0% (130 out of 201) and 82.4% (346 out of 420). The reliability of the scale was high (Cronbach  $\alpha=0.90$ ).

**Results:** Ratings of tutors and students respectively on identified outcomes of PBL varied between 3.80-4.69 and 3.69-4.27 out of 5 points. Both groups gave high ratings to the areas of clinical reasoning, communication and problem solving and gave lower ratings to gaining basic science knowledge. Basic science tutors rated the areas of problem solving, gaining basic science knowledge and intrinsic motivation of students significantly higher than did clinical science tutors.

**Discussion:** According to the results of this study, tutors' and students' opinions about PBL outcomes were similar to those previously reported in the literature. Both groups had positive opinions about PBL's effectiveness. As has been reported in other studies, tutors and students gave the lowest ratings to the area of gaining basic science knowledge. However, the ratings of basic science tutors were higher than those of clinical science tutors in this area. This may be due to pre-existing beliefs of clinical science tutors regarding the effectiveness of PBL for teaching factual basic science knowledge.

**Key words:** PBL, opinions of students and tutors, PBL effectiveness

Problem-based Learning (PBL) was introduced as a revolutionary approach to medical education at McMaster University Faculty of Medicine in the early 70's. Since that time PBL has been adopted by many medical schools around the world. PBL is a learning method based on the principle of using problems as a starting point for the acquisition and integration of new knowledge.<sup>1</sup> Several advantages have been associated with the method. Acquisition of retrievable and usable-robust knowledge, integration of basic and clinical science knowledge, self-directed learning skills, clinical reasoning skills, awareness of the limitations of one's knowledge, communication skills and motivation are some outcomes that have been associated with PBL in the literature.<sup>1-7</sup>

Dokuz Eylul University School of Medicine (DEUSM) began a PBL curriculum in the 1997-1998 academic year under the leadership of Dean Emin

Alici. The duration of undergraduate medical education is six years. PBL is the principal educational strategy in the first three years of undergraduate program. Task-based learning was adopted as an educational strategy for clerkships at the 2000-2001 academic year. The first three years of undergraduate education are structured on a modular basis. The weekly schedule of a module allows a variety of educational activities such as PBL sessions, lectures, field studies, laboratory practices and independent studies. PBL sessions are the main focus of the modules. Lectures are limited to one hour a day. They only support PBL sessions and give some clues to increase the motivation, curiosity and efficiency of the independent learning of students. By means of PBL sessions, the curriculum focuses on knowledge, comprehension, application analysis and evaluation of the cognitive domain. The curriculum is horizontally and vertically integrated. The basic and clinical

sciences are fully integrated and new concepts are built on prior knowledge and skills. The educational principles of the curriculum are structured to allow a smooth and gradual transition from basic sciences to clinical sciences and from normal functions to pathology. The curriculum adopts a spiral configuration, so that the concepts are learned repeatedly at higher and higher degrees of sophistication and abstraction at different levels. Community-based education activities begin in the first year and continue until the end of medical education.<sup>8,9</sup>

Faculty roles in a PBL curriculum differ from those of the traditional faculty member, and might include tutoring, coaching clinical skills, and case writing, in addition to the more traditional roles of lecturing and serving on educational committees.<sup>10,11</sup> During a period of curricular innovation, the adaptation of faculty to the demands of the innovation is essential for the development and continuity of the program. Therefore, at the beginning of the curriculum reform, experts from different countries were invited to DEUSM to provide seminars and workshops on curriculum development and analysis, as well as on PBL philosophy and implementation steps. In April 1997, a faculty development program was organized as two consecutive courses; a course in basic training skills and a course in PBL designed to train faculty to be PBL tutors.<sup>12</sup> These programs gave faculty the opportunity to develop an understanding of educational methods and theory and changed many participants' view shifted from a faculty-centered approach to a student-centered. Fac-

ulty who completed the PBL course were soon assigned to tutor groups. They participated in weekly tutor meetings and shared their observations and experiences with experienced tutors.

It is essential for the success and continuity of a new system that tutors and students view the innovation positively. The aim of this study is to determine how students and tutors view the effectiveness of Problem-based Learning at DEUSM.

### Methods

A questionnaire consisting of a five-point Likert scale and an open-ended question about PBL effectiveness was administered in February and March 2001. In January 2001, the questionnaire was applied to ten students and seven tutors and some revisions were made according to the pilot study. Descriptive information about the age and gender of the participants was also collected. Tutors and students were asked to rate (1:minimum, 5:maximum) to each item of the scale regarding the outcomes of PBL. Inquiry forms were distributed to faculty members who had actively participated as tutors in different periods since the beginning of the PBL curriculum. Tutors returned forms to the Medical Education Department during a one-week period. Their response rate was 65.0% (130 out of 201). Forms were distributed to preclinical students (first, second and third year) at the beginning of a PBL session and one student from each group collected and submitted the forms within a one week period. Their response rate was 82.4%

**Table 1. Student and Tutor Opinions about PBL effectiveness in DEUSM**

Outcome Items	Average point given by tutors	Average point given by students	P value*
Gaining clinical reasoning skills	4.69 ± 0.48	4.27 ± 0.91	.000**
Facilitation of problem solving skills	4.54 ± 0.63	4.20 ± 0.91	.000**
Facilitation of communication skills	4.68 ± 0.49	4.02 ± 1.03	.000**
Facilitation of self-directed learning	4.64 ± 0.53	3.90 ± 1.09	.000**
Gaining robust, retrievable knowledge	4.28 ± 0.75	3.93 ± 0.98	.000**
Gaining basic science knowledge	3.80 ± 1.06	3.69 ± 1.05	.315
Facilitation of integration of basic and clinical science knowledge	4.40 ± 0.77	3.92 ± 0.98	.000**
Increasing intrinsic motivation of student	4.50 ± 0.56	3.88 ± 1.04	.000**
Facilitation of development of self-assessment and peer-assessment skills	4.34 ± 0.69	3.99 ± 0.99	.000**
Overall effectiveness of PBL	4.38 ± 0.67	3.88 ± 0.98	.000**

\* Independent-Samples T Test

\*\*Statistically significant

(346 out of 420). The reliability of the scale was high (Cronbach  $\alpha= 0.90$ ). SPSS 11 For Windows was used for data analysis.

## Results

The mean age of tutors' and students' was respectively  $39.5 \pm 6.4$  and  $20.4 \pm 1.4$ . The gender distribution of the tutors and students was as follows; 43.1% of the tutors were female and 56.9% were male, 46.8 % of the students were female, and 52.6% were male. The average tutor ratings across items varied between 3.80-4.69, average student ratings varied between 3.69-4.27 out of 5 points (Table1). The comparison of the average ratings of the students according to their year levels; first-year students' ratings were slightly higher than those of second and third year students, no statistical difference was found between the ratings of first, second and third year students. Regarding the effectiveness of PBL, student and tutor groups rated the areas of clinical reasoning skill, communication skills and problem solving skills highly whereas the ratings for the area of gaining basic science knowledge were lower. Except the item of gaining basic science knowledge, tutor ratings of all items were significantly higher than student ratings ( $p<0.05$ ). Tutors from basic science rated all items higher than tutors from clinical science (Table 2), with significant differences between basic science and clinical tutors in the areas of problem solving skills, gaining basic science knowl-

edge and intrinsic motivation of students ( $p<0.05$ ).

## Discussion

Tutors and students rated PBL effectiveness highly. They agreed that the gaining of clinical reasoning skills is one of the main outcomes of PBL, giving it the highest rating. The next most highly rated by both tutors and students were communication skills and problem solving skills. Tutors' and students' mean scores for overall effectiveness of PBL as a learning method were respectively 4.38 and 3.88 out of 5 points. Both groups gave the lowest rating to acquisition of basic science knowledge. Except for this item, scores of tutors in all areas were significantly higher than scores of students ( $p< .005$ ). The fact that the tutors' score are higher than students may be due to the critical view of students in the evaluation of educational activities, tutors and all components of educational program with rating scales in PBL curriculum. Their feedback is an important data for curriculum revision studies. They are aware of the importance of their feedback and they are used to being critical in general. The relatively low response rate of the tutors may have biased the results. The reasons of low response rate were investigated. Some faculty members who have crucial roles in education admitted that they simply neglected to send inquiry forms to Medical Education Department due to their intensive workload. All of the tutors were experienced in both the traditional curriculum and in PBL and were able to compare the

**Table 2. Basic and Clinical Science Tutor Opinions about PBL effectiveness in DEUSM according specialties**

Outcome Items	Average point given by basic science faculty (n:37)	Average point given by clinical science faculty (n:93)	P value*
Gaining clinical reasoning skills	4.76±0.43	4.67±0.49	.346
Facilitation of problem solving skills	4.72±0.45	4.47±0.67	.038**
Facilitation of communication skills	4.81±0.40	4.63±0.51	.071
Facilitation of self-directed learning	4.77±0.43	4.60±0.55	.105
Gaining robust, retrievable knowledge	4.46±0.56	4.23±0.80	.123
Gaining basic science knowledge	4.23±0.73	3.66±1.12	.006**
Facilitation of integration of basic and clinical science knowledge	4.54±0.61	4.34±0.83	.198
Increasing intrinsic motivation of student	4.75±0.44	4.41±0.58	.002**
Facilitation of development of self-assessment and peer-assessment skills	4.46±0.56	4.30±0.74	.270
Overall effectiveness of PBL	4.47±0.56	4.35±0.71	.369

\*Independent-Samples T test

\*\*Statistically significant

two. The score range given by the tutors across all the items of the scale ranged between 3.80-4.69. In general, basic science faculty ratings of PBL outcomes were higher than those of clinical science faculty. There was statistical significance between basic science and clinical tutors' in the areas of problem solving skills, basic science knowledge and intrinsic motivation of students ( $p < 0.05$ ). However, there was no significant difference between the two groups in their ratings of overall effectiveness of PBL. In general, students and tutors used positive statements in responding to open ended question soliciting their opinions and suggestions about the PBL curriculum. Tutors cited the importance of detailed tutor guides and continuing education on PBL philosophy and method. They requested an advanced tutoring skills course and suggested required participation of all tutors in weekly tutor meetings. Students suggested improvement in library facilities, Learning Resources Center and computer lab. Most of them cited the importance of tutors' motivation and probing them to the limits of their knowledge.

According to Vernon's meta-analysis of studies that compare PBL with traditional methods of medical education, PBL was found to be significantly superior with respect to students' program evaluations.<sup>13</sup> In the DEUSM study, although students' overall ratings were lower than tutors, scores were above the midpoint of the scale. Higher ratings were given to gaining clinical reasoning skills, facilitation of problem solving skills, communication skills and self-assessment, peer-assessment skills. Vernon reviewed the attitudes and opinions of tutors in PBL, comparing PBL and traditional curricula. The respondents evaluated PBL more positively than traditional methods in seven of nine specific areas. They gave high ratings to student interest and enthusiasm, faculty interest and enthusiasm, the respondents' personal satisfaction, student reasoning, and preparation for clinical rotations. Traditional methods were judged to be superior for teaching factual knowledge of basic sciences.<sup>14</sup> In a later study Vernon compared the attitudes and opinions of faculty who did not participate in a new PBL curriculum with those who did participate. Participants were significantly more positive and judged the new PBL curriculum to be superior in most respects. Both groups gave highest ratings in the areas of student interest, clinical preparation, and medical reasoning and lowest ratings in the teaching of factual knowledge in the basic sciences and efficiency of learning.<sup>15</sup> DEUSM study results were consistent with these findings. We compared the ratings of basic science tutors with those of tutors from clinical faculty. Although basic science tutors were the expert of basic science knowledge, they

rated the item of gaining basic science knowledge significantly higher. This result may be due to the pre-existing beliefs of clinical science tutors about the effectiveness of PBL in the coverage of science content areas. Although tutors gave the lowest ratings in the area of gaining basic science knowledge, the mean rating was above the midpoint.

According to the results of this study, tutors' and students' opinions about PBL outcomes were consistent with the literature.<sup>1-6</sup>

Such positive opinions of the PBL curriculum are essential for the success and continuity of the educational program of DEUSM. Further studies are being planned for monitoring the tutors' and students' opinions and the attitudes in DEUSM.

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