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Learning Outcomes and Tutoring in Problem Based-Learning: How do Undergraduate Medical Students Perceive Them?

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Abstract

Objectives: To explore opinions of undergraduate medical students regarding learning outcomes of the instructional strategy of Problem Based Learning (PBL). In addition their views were sought about the role of tutors and qualities of effective tutors.

Method: This was a cross-sectional, questionnaire based study which was conducted in two colleges of Medicine, Central region, Saudi Arabia during the period of 1st of April to 30th June 2012.

Results: One hundred seventy four undergraduate medical students participated in this study. Seventy percent of participants have indicated that PBL strategy contributed to the development of their knowledge, presentation skills, team work abilities, and accepting criticism from other colleagues. Regarding the tutors' role in PBL tutorials, majority of the participants (75%) indicated that this role is essential, nevertheless, only 58% of students indicated that this role is clear and well identified. Sixty three percent of participants preferred a member role in the PBL tutorials and 80 percent of participants preferred both content and process expert tutors in the PBL tutorials. Significant statistical difference was noted between the views of students and their schools, gender, and study phase.

Conclusion: Majority of the participants believed that PBL had a positive impact on the development of their cognitive, personal and teamwork skills. The view of the students in this study and the available evidence suggest that tutor should have both qualities; content and process expertise, in order to have the best outcomes from the PBL tutorials.

Keywords: Problem Based Learning, Teaching, Undergraduate Medical Education.

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Introduction

Problem based learning (PBL) is an educational strategy that is being increasingly utilized in the undergraduate medical curriculums locally and internationally.[1-3] This trend has been attributed to the reported benefits of this educational strategy compared to those of traditional approaches.[4-6] These benefits include development of life-long learning, critical thinking, and team work skills.[7-9]

Tutor and tutoring are among the most important factors that influence the effectiveness of the PBL strategy[10] as tutors play a central role in facilitating PBL tutorials and help students to achieve their learning objectives.

Qualities of effective tutors include; awareness of students' learning strategies and group dynamics, provision of appropriate and timely feedback, and tutors' interpersonal and communication skills.[10,11]

It is believed that the tutor expertise has significant effects on outcomes of PBL tutorials. It has been shown that content expert tutors tend to interfere frequently and suggest issues and topics in students' discussion more than non-content expert,[12] which might interferes with the group discussion and minimize learning benefits. On the other hand process expert tutors tend to focus on the PBL tutorial process and have minimal interference on the content of the discussion. This behavior of the process-expert tutor will likely encourage students to apply skills of clinical reasoning and problem solving skills and will lead to better learning outcomes.[12,13]

The perception of undergraduate medical students regarding the qualities of tutoring and effectiveness of tutor is of a remarkable importance. In fact, reports demonstrated that students were able to identify features of effective tutoring and could provide specific feedback for tutors about their deficiencies.[14, 15]

Available data showed that undergraduate medical students in Saudi Arabia are satisfied with PBL curriculums.[16,17] However, little is known about their view about learning outcomes and tutoring in PBL.

This study was carried out to explore opinions of undergraduate medical students regarding learning outcomes of PBL. In addition their views will be sought about the role of tutors and qualities of effective tutors.

Methodology

This is a cross-sectional, questionnaire based study which was conducted in two colleges of Medicine, central region, Saudi Arabia during the period of 1st of April to 30th June 2012. Both colleges have adopted hybrid PBL, system-based and community oriented curriculum.

The hybrid curriculum of these two medical colleges is composed of PBL sessions supported by other activities such as lectures, communication skills sessions, community doctor sessions and personal and professional development sessions. Both medical colleges accept male and female students.

The curriculum at both colleges is composed of three main phases; pre-professional, pre-clinical and clinical phases. The main instructional approach in the system-based pre-clinical and discipline-based clinical phases is Problem Based Learning.

The self-administered, anonymous questionnaire includes general demographic information such as age, Grade Point Average (GPA), school and level of the study. GPA is an indicator for students' academic achievement. The questionnaire also includes questions to assess the learning outcomes of the PBL from students' perspective. These questions include improvement of students' knowledge, communication and teamwork skills, and willingness to accept criticism from other students. The role of tutor and whether content-expert or process-expert tutor is more preferable for the PBL tutorials were also explored. Students were requested to express their opinions about the importance of these learning outcomes by rating each learning outcomes on a five points Likert scale as following: (1) strongly disagree. (2) disagree, (3) don't know, (4) agree and (5) as strongly agree. For the analysis purposes 1 and 2 were grouped as disagree, and 4 and 5 were grouped as agree.

The questionnaire was developed in light of the stated objectives and purposes of the study. Methodologies of some relevant published researches were reviewed and relevant questions that could investigate the objectives of the study were selected to be utilized in the questionnaire. Pilot study of the questionnaire was conducted to increase its validity and clarity. Results of the pilot study were not included in the study.

Due to the fact that PBL is the main instructional method in the preclinical, phase 2 and clinical, phase 3 and to ensure familiarity of students to the PBL concept, only students from phase 2 and phase 3 were included in this study. Students from phase 1 were excluded from this study as their exposure to the instructional strategy of PBL is not adequate and their ability to evaluate its benefits is limited.

Data was coded, entered and analyzed using the Statistical Package for Social Sciences (SPSS), version 17. Descriptive analyses were done to summarize information by calculating the number and percent for categorical variables, whereas the mean and standard deviation (SD) were calculated for continuous variables. Chi-square test was used to measure difference. A p-value less than 0.05 was used to determine the statistical significance.

The proposal of this study was reviewed and approved by the King Abdullah International Medical Research Center, King Saud Bin Abdul-Aziz University for Health Sciences, Riyadh, Saudi Arabia.

Results

One hundred and seventy four undergraduate medical students from two medical schools in Riyadh participated in this study. The mean age of participants was 22.5 years (+/- 2.8 SD) and male students constituted 68% of the sample. Sixty six percent of the sample were from school 1 and 71% of them were in phase 3 of their study.

About 70% of participants have indicated that PBL strategy contributed to the development of their knowledge, presentation skills, team work abilities, and accepting criticism from other colleagues as shown in table 1. Students from school 1 perceived the development in these competencies more than students from school 2. This difference was statistically significant.

Regarding the tutors' role in PBL tutorials, about 75% of participants indicated that this role is essential, nevertheless, only 58% of students indicated that this role is clear and well identified. The gender of participants, their school, and the phase of the study is associated with significant difference regarding the view of the clarity of the tutor's role as shown in table 2. Female, students from school 2 and those in phase 3 indicated less clear tutor's role compared to their male, students from school 1 and in phase 2 colleagues.

Sixty three percent of participants preferred member role in the PBL tutorials, whereas 33% enjoy chairman role, and only 15% enjoy scribe role. These preferences were not influenced by gender, school, or phase of study of students.

About 80 percent of participants prefer both content and process expert in the PBL tutorials, whereas 12% and 11% prefer content expert and process expert respectively.

The details of the students' view of the tutors' characteristics are shown in table 3. Students from school 1 prefer content and process expert tutors more than students from school 2 with a significant statistical difference. Chi-square: 7.91 df: 2 (p-value: 0.01).

Discussion

This study was carried out to examine the views of undergraduate medical students regarding the effect of the PBL teaching strategy on their competencies and on tutor's role and tutoring in PBL.

About 70% of the participants felt that PBL contribute to the development of their cognitive competencies, presentation, and team-work skills. In fact it has been reported that PBL approach is as effective as other instructional approaches in the development of learner's cognitive competencies.[9,18] In addition to the positive effect of PBL teaching strategy on motivating students and developing their clinical reasoning skills, the use of this approach lead to better outcomes in the development of communication, interpersonal , and collaborative skills of students compared to traditional approaches.[19,20]

In addition, participants thought that the PBL could help students in accepting contrary views and criticism from other students and

staff. This confirms finding from previous studies which demonstrate the positive attitude of students regarding the concept of feedback and willingness to receive and utilized it.[21-23]

There was a reported significant difference between the perceptions of medical students on the learning outcomes of PBL. Students from school 1 perceived better development in different outcomes compared to students from school 2. This finding might be due to the actual implementation of the concept of the PBL. Other organizational and administrative reasons could contribute to this view as well.

Students, in general, valued the presence and the essential role of tutor in the PBL tutorials, however, only 58% of them stated that tutor's role is clear enough to them. This finding is probably due to the difference between the expected role of the tutor in PBL tutorials and students' expectation. Tutors are expected to act as facilitator to the tutorials and not information provider.[10,11] In addition, tutor should ensure effective group dynamics through encouraging active involvement of students.[10]

It was observed that students in phase 3, the clinical phase, reported a less clear role of tutors. This is probably due to the fact that PBL tutorials are less frequently used in clinical rotations and some of the PBL sessions are led by students. The observation of infrequently used PBL in clinical rotations is consistent with the practice in comparable settings.[24]

A third of participants preferred the chairman role in PBL tutorials. By which, in addition to the member roles they would have other responsibilities as managing the discussion and time keeping.

The majority of participants considered that tutor to be effective should have both expertise; content and process. This view is in-keeping with reported findings which suggest that both expertise; content and process are required for effective tutoring. Effective tutor should have clinical knowledge, appropriate facilitative skills, and abilities to stimulate self-directed and collaborative learning.[12,13,15]

The difference between the views of students from the two involved medical colleges suggests different implementation of the PBL tutorials which probably encourages the process of reviewing the PBL process and recommend changes for better and effective implementation of PBL tutorials.

This noted difference between the views of medical students from two sites suggests exerting more efforts towards unification and standardization of the curriculums of medical colleges in Saudi Arabia to ensure quality and minimize the difference of the learning outcomes of undergraduate medical students in different sites.

Limitations of the study

As the benefits of the PBL strategy was based on the perception of medical students, more measures are needed to evaluate these learning outcomes objectively.

The reported difference of the learning outcomes among students in the two medical schools could be influenced by certain characteristics of tutors. As the qualifications and facilitation skills of tutors could influence significantly the learning outcomes of students. The exploration of effect of this particular factor is needed in future researches.

Conclusion

Majority of participants believed that PBL had a positive impact on the development of their cognitive, personal and teamwork skills. Undergraduate medical students value the vital role of tutor; however his/her role should be made clear to them in order to have more effective tutorials. The view of students in this study and the available evidence suggests that tutor should have both qualities, content and process expertise, in order to have the best outcomes from the PBL tutorials.

The observed difference between the students in different settings should encourage decision makers to review the PBL process and implement appropriate measures for better outcomes of PBL tutorials.

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Table I. Learning Outcomes of Problem Based Learning

	SEX					STUDY LEVEL					SCHOOL				
	Male N (%)	Female N (%)	Total N (%)	X^2	P-Value	Phase II N (%)	Phase III N (%)	Total N (%)	X^2	P-Value	I N (%)	II N (%)	Total N (%)	X^2	P-Value
• Improve my knowledge															
Agree	88 (74)	17 (74)	105 (74)			76 (82)	28 (61)	104 (74)			71 (85)	34 (58)	105 (74)		
Undecided	9 (8)	3 (13)	12 (9)	1.01	0.60	2 (12)	8 (17)	10 (7)	12.26	**0.02 ***	4 (5)	8 (4)	12 (9)	13.95	**0.01 ***
Disagree	22 (19)	3 (13)	25 (18)			15 (16)	10 (22)	25 (18)			8 (10)	17 (29)	25 (18)		
Total	119 (100)	23 (100)	142 (100)			93 (100)	46 (100)	139 (100)			83 (100)	59 (100)	142 (100)		
• Improve my presentation skills															
Agree	79 (68)	14 (61)	93 (67)			59 (66)	32 (70)	91 (67)			58 (72)	35 (60)	93 (67)		
Undecided	20 (17)	4 (17)	24 (17)	0.76	0.68	14 (16)	9 (20)	23 (17)	1.57	0.45	15 (18)	9 (15)	24 (17)	5.16	0.07
Disagree	17 (15)	5 (22)	22 (16)			17 (19)	5 (11)	22 (16)			8 (10)	14 (24)	22 (16)		
Total	116 (100)	23 (100)	139 (100)			90 (100)	46 (100)	136 (100)			81 (100)	58 (100)	139 (100)		
• Improve my Teamwork skills															
Agree	79 (67)	17 (74)	96 (69)			65 (72)	28 (61)	93 (69)			62 (76)	34 (59)	96 (69)		
Undecided	22 (19)	2 (9)	24 (17)	1.45	0.48	14 (15)	10 (22)	24 (17)	1.57	0.45	16 (19)	8 (14)	24 (17)	14.30	**0.01 ***
Disagree	16 (14)	4 (17)	20 (14)			12 (13)	8 (17)	20 (15)			4 (5)	16 (28)	20 (14)		
Total	117 (100)	22 (100)	140 (100)			91 (100)	46 (100)	137 (100)			82 (100)	58 (100)	140 (100)		
• Help me in accepting criticism															
Agree	79 (67)	16 (70)	95 (67)			63 (69)	29 (63)	92 (67)			63 (76)	32 (55)	95 (67)		
Undecided	19 (16)	4 (17)	23 (16)	0.22	0.89	17 (18)	6 (13)	23 (17)	2.85	0.24	15 (18)	8 (14)	23 (16)	15.65	**0.001 ***
Disagree	20 (17)	3 (13)	23 (16)			12 (13)	11 (24)	23 (17)			5 (6)	18 (31)	23 (16)		
Total	118 (100)	23 (100)	141 (100)			92 (100)	46 (100)	138 (100)			83 (100)	58 (100)	141 (100)		

***Significant P value.**

Table 2: Role of Tutors in Problem Based Learning

		Tutors role is essential				Tutors role is clear			
		Agree N (%)	**Undecided** N (%)	**Disagree** N (%)	**Total** N (%)	**Agree** N (%)	**Undecided** N (%)	**Disagree** N (%)	**Total** N (%)
Sex	Male	85 (72)	18 (15)	15 (13)	118 (100)	59 (50)	24 (20)	36 (30)	119 (100)
	Female	42 (77)	7 (13)	6 (11)	55 (100)	41 (75)	7 (13)	7 (13)	55 (100)
	TOTAL	127 (73)	25 (15)	21 (12)	173 (100)	100 (58)	31 (18)	43 (25)	174 (100)
	X^2	0.36				9.92			
	P-Value	0.83				**0.01 ***			
Schools	I	94 (83)	13 (11)	7 (6)	114 (100)	77 (67)	19 (17)	19 (17)	115 (100)
	II	33 (56)	12 (20)	14 (24)	59 (100)	23 (39)	12 (20)	24 (41)	59 (100)
	TOTAL	127 (73)	25 (15)	21 (12)	173 (100)	100 (58)	31 (18)	43 (25)	174 (100)
	X^2	15.78				14.83			
	P-Value	**0.01 ***				**0.01 ***			
Study Phase	II	98 (79)	14 (11)	12 (10)	124 (100)	80 (64)	20 (16)	25 (20)	125 (100)
	III	29 (63)	9 (20)	8 (17)	46 (100)	19 (41)	9 (20)	18 (39)	46 (100)
	TOTAL	127 (75)	23 (14)	20 (12)	170 (100)	99 (58)	29 (17)	43 (25)	171 (100)
	X^2	4.54				8.13			
	P-Value	0.10				**0.01 ***			

***Significant P value.**

Table 3: Quality of Tutors in Problem Based Learning

		Process Experience			**Content Experience**			**Both**		
		Yes N (%)	**No** N (%)	**Total** N (%)	**Yes** N (%)	**No** N (%)	**Total** N (%)	**Yes** N (%)	**No** N (%)	**Total** N (%)
Sex	Male	13 (11)	103 (89)	116 (100)	19 (16)	97 (84)	116 (100)	88 (76)	28 (24)	116 (100)
	Female	6 (11)	48 (89)	54 (100)	2 (4)	52 (96)	54 (100)	46 (85)	8 (15)	54 (100)
	TOTAL	19 (11)	151 (89)	170 (100)	21 (12)	149 (88)	170 (100)	134 (79)	36 (21)	170 (100)
	X^2	**0.01**			**5.46**			**1.92**		
	P-Value	**0.61**			**0.01 ***			**0.11**		
School	I	18 (16)	95 (84)	113 (100)	17 (15)	96 (85)	113 (100)	82 (73)	31 (27)	113 (100)
	II	1 (2)	56 (98)	57 (100)	4 (7)	53 (93)	57 (100)	52 (91)	5 (9)	57 (100)
	TOTAL	19 (11)	151 (89)	170 (100)	21 (12)	149 (88)	170 (100)	134 (79)	36 (21)	170 (100)
	X^2	**7.67**			**2.25**			**7.91**		
	P-Value	**0.01 ***			**0.12**			**0.01 ***		
Study Phase Level	II	14 (11)	108 (89)	122 (100)	14 (11)	108 (89)	122 (100)	97 (80)	25 (21)	122 (100)
	III	5 (11)	40 (89)	45 (100)	6 (13)	39 (87)	45 (100)	35 (78)	10 (22)	45 (100)
	TOTAL	19 (11)	148 (89)	167 (100)	20 (12)	147 (88)	167 (100)	132 (79)	35 (21)	167 (100)
	X^2	**0.04**			**0.11**			**0.06**		
	P-Value	**0.59**			**0.46**			**0.83**		

***Significant P value.**

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