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Can different curriculum types affect opinions of tutors and students about problem based learning?

Farklı eğitim programları, eğitim yönlendiricileri ve öğrencilerin probleme dayalı öğrenim hakkındaki görüşlerini etkileyebilir mi?

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Özet

Amaç: Literatürde Probleme Dayalı Öğrenim (PDÖ) ile ilgili öğrenci ve eğitim yönlendiricilerinin memnuniyeti hakkında yapılmış çok sayıda araştırma bulunmaktadır. Ancak PDÖ yöntemini farklı şekillerde uygulayan (tam veya hibrid) programlarda memnuniyeti değerlendiren çalışmalar sınırlı sayıdadır. Bu araştırmanın amacı, eğitim programında PDÖ yönteminin tam veya hibrid program şeklinde uygulayan fakültelerin öğrenci ve öğretim üyelerinin görüşlerini belirlemektir.

Gereç ve Yöntem: Bu araştırma tam PDÖ yöntemini ve hibrid eğitim yöntemini uygulayan iki tıp fakültesinin öğrencileri ve eğitim yönlendiricileri (n=707) üzerinde gerçekleştirilmiştir. Eğitim yönlendiricileri ve öğrencilerin, PDÖ hakkındaki görüşlerini belirlemek amacı ile yazarlar tarafından hazırlanan bir anket formu kullanılmıştır. Anketler PDÖ'nün klasik eğitime göre avantajlarını içeren, beşli Likert tipi skala ile cevaplanması istenilen 14 açıklama ve iki spesifik soruyu içermektedir.

Bulgular: Tam PDÖ uygulanan programdaki öğrenci ve eğitim yönlendiricileri, hibrid program uygulayan fakültenin öğrenci ve eğitim yönlendiricilerine göre, PDÖ'nün literatürde belirtilen avantajları ile ilgili daha olumlu yönde görüş bildirmiştir.

Sonuç: Bu bulgu, PDÖ'nün avantajlarından daha fazla yararlanılabilmesi için, tam PDÖ uygulamanın, hibrid program uygulamaya göre daha yararlı olabileceğini göstermektedir.

Anahtar Sözcükler: Probleme dayalı öğrenim, eğitim programı, tıp fakültesi öğrencisi, eğitim yönlendiricisi.

Summary

Aim: *There is numerous literature available on the studies regarding the satisfaction of students and tutors with the Problem Based Learning (PBL) approach, however the research investigating views of both sides of the different implementations of PBL (full or hybrid) is limited. Our objective is to ascertain different opinions of medical students and tutors on PBL and compare their opinions on the basis of curriculum type. The research will be based on two medical schools with the full PBL and hybrid curricula.*

Materials and Methods: *This study was conducted among students and tutors (n=768) in two medical schools, one of which has a full PBL curriculum and the other a hybrid curriculum.*

A full PBL curriculum has been applied at the Pamukkale University Faculty of Medicine since 1999 to teach basic medical sciences throughout the first three years of medical education. A hybrid curriculum has been applied in Akdeniz University Faculty of Medicine since 2002 to teach basic medical sciences throughout the first two years of medical education.

A "tutor questionnaire" and a "student questionnaire" prepared by the authors to ascertain the views of the participants on PBL were used. The questionnaires included 14 statements scored on a five-item Likert-type scale and two additional specific questions considering previously confirmed advantages of PBL to lectures. Ninety-two percent (n=707) of the target group fully responded to both questionnaires.

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Results: *Students and tutors who attended a school focused which provided a full PBL approach appreciated to a much higher extent the previously confirmed advantages of PBL in lectures more than those who attended a school based on the hybrid approach.*

Conclusion: *PBL curriculum can be considered superior to hybrid curriculum via demonstrating the advantages that a PBL approach can provide.*

Key Words: *Problem based learning, curriculum models, medical students, tutors.*

Introduction

Problem Based Learning (PBL) has been increasingly popular in medical education all around the world since its first implementation in 1969. The main reason for wide acceptance of PBL among medical schools is the benefits that are supported by educational theories and research (1). We know from the literature that PBL helps students develop problem solving skills that include collecting data, reasoning, analyzing, synthesizing, and accessing the knowledge required for the solution of the problem and interpretation of the collected data (2-4). Differential diagnosis is the basic cognitive function of the physicians. In an efficient differential diagnosis process, the first stage is creating a list of possible diagnoses (5-7). PBL improves differential diagnosis skills of medical students since the students suggest alternative hypotheses and look for evidence to prove or disprove these hypotheses. PBL is a student-centered concept and students are responsible for their learning; namely, they need to spare time and effort to learn. PBL requires active participation of the students; by asking, discussing or participating in discussion sessions in and out of class during an independent learning period. Adoption of student-responsibility in PBL strategy has been shown to promote the self-learning capabilities of the students. Self-learning is a key-concept for developing life-long learning habits. Application of knowledge of real-life clinical problems in PBL provides a thorough integration of theoretical information and practical experience especially in the preclinical years of medical education. Small group activities in PBL are highly conducive for students to develop peer-teaching and learning skills, interpersonal communication skills and team-work abilities (8-15).

In addition to active involvement of the students, the role of faculty (tutors) in PBL shifts from knowledge transmission to facilitating the small groups to achieve the desired learning objectives. Therefore students and faculty are two key stake-holders in PBL (16-17). In evaluation of the curriculum, collecting the opinions and reactions of all stake-holders is the first step to investigate whether the intended objectives of the curriculum are achieved, or problematic parts and possible solutions are to be studied (18). Although the literature can be obtained from the studies on the satisfaction of the students or tutors with PBL, studies which examine the views of both sides in different implementation types of the PBL (full or hybrid) are relatively limited (19-25).

The purpose of this study was to determine and compare PBL related views of medical students and tutors in two medical schools, one of which has a full PBL curriculum and the other that adopts a hybrid curriculum.

Materials and Methods

Curriculum Characteristics

Two types of curricula have been studied in this cross-sectional descriptive study:

- *Full PBL curriculum,* which has been applied at Pamukkale University Faculty of Medicine (PUFM) since 1999 to teach basic medical sciences throughout the first three years of medical education. The number of PBL modules in each academic year was 17.

- *Hybrid curriculum*, which has been applied at Akdeniz University Faculty of Medicine (AUFM) since 2002 to teach basic medical sciences throughout the first two years of medical education.

The curriculum of the first two years at Akdeniz University Faculty of Medicine is composed of five thematic blocks structured on the basis of organ system related themes. The first week of each block is allocated to PBL sessions and called “PBL module”. The remaining 5-7 weeks in each block consist of lectures and practicals. The PBL process is assessed by a separate written clinical reasoning exam which is administered at the end of each PBL week (module).

Study Group and Ethical Issues

All PBL tutors and medical students at PUFM and AUFM (n=768), who took part in PBL modules of the first two years of the curriculum in academic year 2009-2010, were invited for the study. A total of 707 voluntary participants (236 tutors and 471 students), who completed all study instruments accurately, constituted the study group. All the participants were informed about the study verbally and a written explanation was also placed into data collection forms. Since the authors are also teachers and assessors of the participating students, special attention was paid to anonymity. Names of the participants or any other hint about their identities were not sought in the study. Ethical approval was obtained from the Ethical Committee of Akdeniz University before the initiation of the study.

Collection of Data

A "*tutor questionnaire*" and a "*student questionnaire*" were prepared by the authors to ascertain the opinions of the participants on PBL. Department of the tutors, the number of the PBL sessions they attended, their satisfaction and general views on the PBL and its contribution to student development were inquired in structured questions in the tutor questionnaire. These questions were particular to tutors and they were not included in the student questionnaire. The main questionnaire was composed of 14 items which were prepared by the authors regarding the points known to be advantages of PBL as an instruction method (2-7). These 14 items were the same in both the tutor and student questionnaires. The difference between the two questionnaires was in their directives and additional questions. In the directives, the tutors were asked to evaluate the contribution of the PBL to their students' progression and the students were asked to evaluate the contribution of the PBL to their own progression. Although evaluation of 14 items by the participants gives detailed information about their satisfaction with the PBL, a separate question *"In total, are you satisfied with the PBL?"* was asked in both forms. In the tutor questionnaire, one more question was included: "*Is PBL a beneficial instructional strategy for your students?"* The participants gave a score for each of the 14 items on a five-item Lykert-type scale between "*1* (Zero contribution)" and "*5* (Highly contributive)" regarding the compatibility of each statement with their prior PBL experiences and opinions. Additional close-ended questions about satisfaction and advantages were answered choosing one of three options, "Yes", "No" or "I am undecided". A total score for each participant was obtained from the questionnaire and then divided by 14 to calculate a mean score over 5 to use in statistical analysis. Both forms also included an open-ended question section to ascertain views and suggestions of the participants about PBL. The forms were delivered to the study group in June 2009, at the end of the 2008-2009 academic year. In both faculties, the questionnaires were delivered to the students in one session and, after explanation of the aim of the study willing participants completed the questionnaires. The questionnaires were sent to the tutors with an explanatory note including study objectives and they were asked to complete and return the questionnaires in one week.

Analysis of Data

Responses "Contributive" and "Highly contributive" in Lykert-type scale were combined as *"Contributive"* and "Undecided", "Not contributive" and "Zero contribution" were combined as *"Not contributive"* for statistical purposes. The departments of the tutors were classified as "Basic Sciences", "Medical Sciences" and "Surgical Sciences" to make comparisons between these three main fields. The Chi-square test was used to compare the distribution and percentages and the Student T-test was used to compare mean scores obtained from PUFM and AUFM.

Results

The questionnaires were completed by 87.7% (n=236) of the tutors and 94.4% (n=471) of the students. Ninety-two percent (n=707) of the target group fully responded to both questionnaires and composed the study group.

The question "*Is PBL a beneficial instructional strategy for your students*?" received the answer "Yes" by 70.3% of all participating tutors, and the positive response rate to this question was higher in the full PBL school than that of the hybrid curriculum. When the positive response rate to this question was analyzed according to the departments (classified as Basic, Medical and Surgical Sciences) of the tutors, it was found that tutors from all three fields in full PBL school showed a greater satisfaction than those in the hybrid curriculum school.

(Table-1).

Table-1: Distribution of answers to the question "*Is PBL a beneficial instructional strategy for your students?***"** among all participating tutors by departments in which they work.

Department/curriculum type		***Is PBL a beneficial instructional strategy for your students*?**					
		Yes		I'm uncertain & No		Statistical analyze	
		Number	%	Number	%	X^2	p
Basic sciences	PBL	23	88.5	3	11.5	0.20	0.47
	Hybrid	27	84.4	5	15.6		
Medical sciences	PBL	28	75.7	9	24.3	1.46	0.22
	Hybrid	41	64.1	23	35.9		
Surgical sciences	PBL	17	94.4	1	5.6	11.02	**0.00**
	Hybrid	30	50.8	29	49.2		
Total	PBL	68	84.0	13	16.0	10.95	**0.00**
	Hybrid	98	63.2	57	36.8		
	Total	**166**	**70.3**	**70**	**29.7**		

Table-2. Distribution of answers to the question "*Are you satisfied with PBL?"* among all participating tutors by departments in which they work.

Department/curriculum type		Are you satisfied with PBL?					
		Yes		I'm uncertain No		Statistical analysis	
		Number	%	Number	%	X^2	p
Basic sciences	PBL	22	84.6	4	15.4	0.39	0.38
	Hybrid	25	78.1	7	21.9		
Medical sciences	PBL	25	67.6	12	32.4	3.47	0.06
	Hybrid	31	48.4	33	51.6		
Surgical sciences	PBL	15	83.3	3	12.7	6.59	**0.01**
	Hybrid	29	49.2	30	50.8		
Total	PBL	62	76.5	19	23.5	10.67	**0.01**
	Hybrid	85	54.8	70	45.2		

Table-3: Answers of tutors and students to the question "Are you satisfied with PBL?"

Participants/curriculum type		Are you satisfied with PBL?					
		Yes		I'm uncertain No		Statistical **analysis**	
		Number	%	Number	%	X^2	p
Tutors	PBL	62	76.5	9	23.5	10.67	**0.01**
	Hybrid	85	54.8	36	45.2		
	Total	147	62.3	45	37.7		
Students	PBL	52	49.5	53	50.5	1.58	0.20
	Hybrid	176	56.6	135	43.4		
	Total	228	54.8	188	45.2		

The question "Are you satisfied with PBL?" received the answer "Yes" by 62.3% of all participating tutors. The positive response rate to this question was significantly higher in the full PBL school (Table-2). The same question received the answer "Yes" by 54.8% of all participating students and this rate was slightly higher (56.6%) in the school with the hybrid curriculum (Table-3).

According to the tutors, PBL contributed mostly in the skills of self-expression, problem solving, interpersonal relations, team-work and communication. Students appreciated the contribution of PBL to their own progression mostly in the skills of problem solving, reasoning and self-expression (Table-4).

When the questionnaire scores of the students from the full PBL school and hybrid curriculum school were compared, the scores of the full PBL school students were higher than those of the other school's students in all except two items. The difference between the scores of the two different schools was statistically significant on seven items (Table-5).

When questionnaire scores of the tutors from the full PBL school and hybrid curriculum school were compared, scores of the full PBL school tutors were higher than those of the other school's tutors on all items. The difference between the scores of two different schools was statistically significant on all but one item (Table-6).

Discussion and Conclusions

Our results are similar to the results of the studies carried out among students and tutors to obtain their views on PBL (20-22). In a survey carried out among 1,287 medical teachers in US and Canada medical schools, a majority of the participants reported that PBL had apparent advantages over traditional lectures for students' learning (20). Similarly, more than 70% of the tutors in our study found PBL to be a beneficial application for students and around 60% of them were satisfied with PBL. Considering the results obtained from our questionnaires, advantages of PBL over traditional teaching mentioned in the literature were also appreciated by both of the tutors and students in our study. High levels of satisfaction with the instruction method are known to have a strong relationship with high levels of achievement to the intended learning objectives (18).

It is notable in our findings that the satisfaction rate of the tutors with PBL is higher among those working in Basic Science Departments in both schools. In light of the fact that the main purpose of PBL use in medical education that is to teach basic sciences with the help of clinical scenarios, a higher satisfaction rate among tutors from departments of basic sciences is meaningful and shows that PBL helps in achieving basic science objectives as well.

Table-4. The distribution of the tutors and the students who scored 4 or 5 on Likert scale for contribution of PBL in developing skills on 14 questionnaire items.

Questionnaire items	*Tutors*		*Student*	
	PBL (%)	Hybrid (%)	PBL (%)	Hybrid (%)
Communication skills	82.7	66.5	71.3	67.2
Skills for interpersonal relationships and adaptation to teamwork	82.7	69.9	11.2	65.9
Problem solving skill	84.0	63.2	85.2	72.6
Self expression skills in terms of knowledge transmission to the group members	84.0	71.0	78.5	61.7
Reasoning skills	81.5	62.6	81.5	71.7
Self learning skills	81.5	68.2	72.0	67.7
Skills for selecting required knowledge from a large information source	80.6	73.5	75.3	70.8
Preparation for vocational life	75.3	43.1	62.6	60.7
Decision-making skills	72.8	50.3	67.3	60.4
Enhanced motivation to learn	71.6	48.1	59.8	50.8
Evidence based data gathering via internet and library	71.6	63.6	58.3	73.2
Bio-psychosocial approach to the patients	69.1	47.1	67.3	70.0
Life-long learning	64.2	45.4	62.0	46.6
Integration and adaptation of gained information	59.3	50.6	74.1	70.7

Table-5. Mean scores given by the students on five item Likert scale for contribution of PBL in developing skills on 14 questionnaire items.

Questionnaire items	PBL		Hybrid		Statistical analysis	
	Mean	(±)SD	Mean	(±)SD	p	t
Self expression skills in terms of knowledge transmission to the group members	4.05	1.01	3.57	1.06	**0.00**	-4.14
Problem solving skill	4.00	0.92	3.75	0.96	**0.02**	2.33
Reasoning skills	3.99	0.92	3.75	0.89	**0.00**	-2.40
Integration and adaptation of gained information	3.95	1.01	3.71	1.03	**0.04**	-2.02
Communication skills	3.80	1.08	3.67	1.02	0.23	-1.20
Self learning skills	3.79	1.18	3.59	1.08	0.09	-1.66
Bio-psychosocial approach to the patients	3.72	1.03	3.72	1.00	0.95	-0.06
Decision-making skills	3.71	1.01	3.53	1.01	0.09	-1.66
Preparation for vocational life	3.70	0.99	3.55	1.07	0.20	-1.28
Life-long learning	3.64	1.10	3.23	1.09	**0.00**	-3.31
Skills for selecting required knowledge from a large information source	3.64	0.75	3.11	1.42	**0.00**	-5.12
Enhanced motivation to learn	3.52	1.14	3.31	1.12	0.10	-1.61
Evidence based data gathering via internet and library	3.47	1.28	3.78	1.14	**0.01**	2.27
Skills for interpersonal relationships and adaptation to teamwork	2.06	1.16	3.66	1.02	**0.00**	13.45

Table-6: Mean scores given by the tutors on five item Likert scale for contribution of PBL in developing skills on 14 questionnaire items.

Questionnaire items	PBL		Hybrid		Statistical analysis	
	Mean	(±)SD	Mean	(±)SD	p	t
Skills for interpersonal relationships and adaptation to teamwork	4.21	0.90	3.83	0.91	**0.00**	-3.03
Self expression skills in terms of knowledge transmission to the group members	4.14	0.78	3.78	1.00	**0.00**	-2.79
Communication skills	4.14	0.86	3.67	0.99	**0.00**	-3.65
Problem solving skills	4.14	0.81	3.67	1.01	**0.00**	-3.98
Reasoning skills	4.13	0.83	3.64	0.97	**0.00**	-4.04
Self learning	4.12	0.87	3.71	1.03	**0.00**	-3.19
Enhanced motivation to learn	4.01	0.96	3.35	1.08	**0.00**	-4.71
Decision-making skills	3.96	0.84	3.38	1.07	**0.00**	-4.51
Preparation for vocational life	3.95	0.93	3.28	1.08	**0.00**	-4.88
Evidence based data gathering via internet and library	3.83	0.99	3.70	1.05	0.35	-0.92
Bio-psychosocial approach to the patients	3.80	1.00	3.32	1.09	**0.00**	-3.25
Integration and adaptation of gained information	3.74	0.99	3.38	1.05	**0.01**	-2.51
Life-long learning	3.74	1.04	3.22	1.17	**0.00**	-3.35
Skills for selecting required knowledge from a large information source	3.69	0.88	3.25	1.11	**0.00**	-3.28

Our student participants seem to appreciate the benefits of PBL to gain some basic skills such as problem-solving, communicating, reasoning, deciding, approaching the patient as a whole, integrating the basic and clinical findings and self-learning. However, an interesting finding is that the percentage of the students satisfied with PBL was less in the full PBL school than those in the hybrid curriculum school. This might have arisen from the difference in opportunities to compare PBL with traditional lectures in the two schools. It is obvious that the students in the hybrid curriculum can simply compare two programmers since they have prior experience in both of them and better appreciate the contribution of active learning approach. On the other hand, the students in full PBL school do not have much opportunity to make a comparison between lectures and PBL; moreover, they might have experienced some stress under pressure of the requirements of active learning in PBL.

In the hybrid curriculum school, the tutors working in the department of Surgical Sciences constitute the most dissatisfied group with PBL. The analysis of the answers to the open-ended questions by this group revealed that these tutors mainly complain about time restrictions and do not have enough time to spare for PBL activities during their routine work. In fact, the work-load of faculty in the hybrid curriculum increases since PBL requires an additional effort aside from the lectures. As a solution to this problem, the hybrid curriculum school paid special attention to assign each tutor only once in an academic year in order to decrease the additional burden of PBL.

The most cited suggestions by the tutors are selecting suitable subjects for self-learning and comprehensive discussions and better construction of PBL scenarios. On the other hand, the students requested the tutors to come to the discussion sessions prepared enough to facilitate the group. Other suggestions of the students were to ensure a certain standard among tutors (some contribute more, others less) and a better selection of the subjects and cases to achieve the learning objectives properly.

In conclusion, students and tutors of the full PBL school better appreciated previously confirmed advantages of PBL on lectures than those of the hybrid curriculum school. This suggests that a full PBL curriculum is superior to a hybrid curriculum in terms of demonstrating the benefits of PBL strategy.

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