Evaluating The Role of Tutors in Problem-Based Learning Sessions

Probleme Dayalı Öğrenmede Eğitim Yönlendiricisi Rollerinin Değerlendirilmesi

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ABSTRACT Objective: The aim of this study was to determine students' and tutors' perceptions of the role of tutors in problem-based learning (PBL) sessions and the relationship between the views of students and tutors. **Material and Methods:** An instrument (Hacettepe Tutor Evaluation Scale-HTES) was developed to determine the view of students and tutors on the role of the tutor. The scale, rated on a 5-point Likert scale, contains 4 dimensions: supporting the learning process and metacognitive knowledge; conducting PBL; communication and supporting students' autonomy; and assessing and giving feedback. The subjects of the study were 2nd and 3rd year students and tutors. 89% of students and 88% of tutors completed the study. **Results:** All the statements received high scores; sex, year and curricular language had no effect on the results. Differences between the mean scores of the 4 dimensions were analyzed and were statistically significant. The difference between the mean values for dimensions in the scores of tutors and the student were both statistically significant. The correlation between the scores of students and tutors was analyzed and was not statistically significant. **Conclusion:** The results of our study demonstrated that the tutors required the skills and attitudes for "supporting the learning process and metacognitive knowledge" and "assessing and giving feedback". As there was no consensus on the roles of the students and tutors in PBL, activities should be organized for sharing and discussing the principles of PBL, its components and the different roles. Feedback from students is important and has priority.

Key Words: Problem-based learning; faculty, medical; students

ÖZET Amaç: Bu araştırmanın amacı, probleme dayalı öğrenmede eğitmen rolleri ile ilgili öğrenci ve eğitim yönlendiricilerinin görüşlerinin ve bu iki grubun görüşleri arasındaki ilişkinin incelenmesidir. **Gereç ve Yöntemler:** Çalışmada öğrenci ve eğitmen görüşlerini belirleyebilmek için bir ölçek (Hacettepe Eğitim Yönlendiricisi Değerlendirme Ölçeği-HEYDÖ) geliştirilerek kullanılmıştır. Likert tipi, 5 dereceli olan ölçeğin 4 boyutu bulunmaktadır: Öğrenme sürecinin ve üst-biliş bilgisinin desteklenmesi, PDÖ'nün yürütülmesi, iletişim ve öğrenci özerkliğinin desteklenmesi ve geri bildirim verme ve değerlendirme. Çalışmaya 2. ve 3. yıl öğrencileri ve eğitim yönlendiricileri katılmıştır. Katılım yüzdesi öğrenciler için %89, eğitim yönlendiricileri için %88'dir. **Bulgular:** Ölçekteki önermelerin tümü yüksek puanlar almış; cinsiyet, yıl ve öğretim dilinin sonuçlar üzerinde etkisi olmadığı görülmüştür. Ölçeğin dört alt boyutunun ortalama değerleri arasındaki farklar incelenmiş ve istatistiksel olarak fark belirlenmiştir. Eğitim yönlendiricilerinin ölçek alt boyutlarına verdikleri puanların ortalama değerleri arasındaki farklar, öğrencilerin puanlarında olduğu gibi, istatistiksel olarak önemlidir. Öğrencilerin ve eğitim yönlendiricilerinin puanları arasındaki korelasyon incelenmiş ve istatistiksel olarak önemli bir ilişki belirlenmemiştir. **Sonuç:** Çalışmadan elde edilen sonuçlar eğitim yönlendiricilerinin "öğrenme sürecinin ve üstbiliş bilgisinin desteklenmesi" ve dönüt verme ve değerlendirme" açısından desteklenmesi gerektiğini göstermektedir. Eğitmen ve öğrencilerin eğitim yönlendiricisinin rolleri hakkında ortak görüşte olmadığı belirlenmiştir. Bu nedenle, her iki gruba yönelik olarak PDÖ'nün ilkelerinin, PDÖ'de farklı rollerin paylaşıldığı ve tartışıldığı etkinliklerin düzenlenmesi yararlı olacaktır. Eğitim yönlendiricisinin rollerine yönelik, eğitim ortamının en önemli katılımcısı olan öğrenciden alınan dönütler önemlidir ve öncelikli olmalıdır.

Anahtar Kelimeler: Probleme dayalı öğrenme; öğretim üyeleri; tıp öğrencileri

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Problem-based learning (PBL) is consistent with current philosophical views of human learning, particularly constructivism. Constructivism assumes that 'knowledge' is not an absolute, but is 'constructed' by the learner based on previous knowledge and an overall view of the world. Knowledge evolves through social negotiation and an evaluation of the validity of individual understanding. Thus, learning happens when one has the opportunity to gain knowledge for oneself, to contrast one's understanding of that knowledge with others' understanding, and to refine or restructure that knowledge as more relevant experience is gained. In contrast, the traditional view of medical education holds that students can be told the "truth" about what is known about medicine; because they have been told, they would all then have the same knowledge and understanding of the content.[1]

PBL consists of four elements: students, the problem or scenario, evaluation and a tutor. Students are involved in clarification of terms and concepts, listing the clinical features or phenomena that need to be explained, analysis of the problem, organization of and summarizing the phenomena, formulation of learning goals, filling gaps in knowledge through individual study, sharing findings with the tutorial group, synthesis and application of acquired knowledge to the problem.[2] The scenarios lead students to a particular area of study to achieve those learning objectives. PBL is successful only if the scenarios are of high quality. Assessment schedules should follow the basic principles of testing the student in relation to the curriculum outcomes and should use an appropriate range of assessment methods. Assessment methods influence student learning.[3,4]

The tutor role is important in PBL.[5] A number of studies have identified important dimensions of tutor performance, which stimulate student learning. The tutor serves as a facilitator rather than the group leader, ceding control of the direction of the discussion, and the agenda for solving the problem to the students. The tutor's task is to ask probing questions, to help students clarify their thinking, and when necessary, to guide group processes.[4,6,7]

Most teachers in medical schools have had primarily lecture-based experience; they are subject-matter experts, and are accustomed to delivering this knowledge to students by lecturing. Understandably, they feel uncomfortable with the tutor role in PBL. Some tutors, confronted with this new role, assume that a tutor should be passive; they follow the student-centered model so rigidly that they, as tutors, become totally uninvolved. In fact, a tutor should encourage specific kinds of cognitive activities, such as making connections, providing feedback and helping students to monitor their own learning. This implies that tutoring requires other skills than lecturing. A tutor's performance may not be a stable teacher characteristic, but may be situation-specific.[8] It is difficult to develop recipes to help teachers conduct PBL sessions.

Shifting from the traditional teaching role to the tutor role in PBL leads to many difficulties in adopting the methodology. When institutions decide to implement PBL, there is a need for faculty development. To be useful, faculty development programs should be based on a theory of effective tutoring and there should be instruments to give tutors feedback about their performance. Such an instrument should be based on the tasks set for the tutor at the school in which the instrument will be used, as well as on theoretical conceptions about the tutor role.[5]

In PBL, students should be aware of the tutor's responsibilities as well as their own. Effective tutors are identified by students as being able to promote discussion and they are often seen as part of the group.[9] Some students, like some of their tutors who have experienced more traditional teaching methods, expect a more teacher-centered approach. Students may have problems adapting to a completely new teaching method; however, the period of adaptation is relatively short for those who have already experienced a similar approach to learning.[10]

The aim of this study was to determine both the students' and the tutors' perceptions of the role of tutors in PBL sessions and the relationship between the views of students and tutors at the Hacettepe University, Faculty of Medicine.

MATERIAL AND METHODS

Subjects

The subjects of the study were 2nd and 3rd year students of both the English and Turkish streams, and tutors. The 284 second-year students were in the Hematology and Cardiovascular Systems Subject Committee and the 351 third-year students were in the Endocrinology Subject Committee. For PBL tutorials, the 2nd year students were organized into 26 groups and the 3rd year students into 22 groups. A tutor facilitated each tutorial group. All the students and tutors were invited to participate in the study (without any sampling); 89% of students (567 students) and 88% of tutors (42 tutors) completed the study.

Research Design and Implementation

An instrument was developed and used to determine the view of the students and tutors on tutor role. PBL tutorials were completed in three sessions. At the beginning of the first PBL session, tutors and students were informed about the research. At the end of the last (3rd) session, students and tutors filled out the instrument.

Instruments

The HTES was developed with items based on the tutor literature. Four experts were asked to determine whether the items fully covered the role of the tutor. After revisions, a pilot study was conducted to ensure that students could understand all the items. Following the pilot study, the scale consisted of 33 items describing the roles of tutors during PBL sessions. Items were rated on a 5-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree".

Principal components analysis with Varimax rotation was used to determine whether the items could be summarized by a smaller set of component scores. During the analysis, the items that had factor loading under 0.45, and less than 0.10 between loadings were removed and factor analysis was repeated. After factor analysis, the scale contained 22 items over 4 dimensions. In the latest version of the scale, the 1st of the important factors accounted for 21.45% of the total variance, the 2nd 16.94%, the 3rd 11.95%, and the 4th 10.76%. The factor loadings of the 4 factors were 0.606-0.707, 0.597-0.781, 0.495-0.728, and 0.712-0.812 respectively. Here are some examples of items included in the scale for each dimension:

- Dimension 1- Supporting the learning process and metacognitive knowledge: (9 items)

  - S/he helped students to solve the problem by asking questions on how to apply newly acquired knowledge to the problem.

  - S/he helped students to correct mistakes by deepening their research on the subject.

- Dimension 2- Conducting PBL (6 items)

  - S/he helped students to define the problem by asking questions on the scenario

  - S/he helped students to determine a hypothesis by asking questions on the problem

- Dimension 3- Communication and supporting students' autonomy: (4 items)

  - S/he encouraged students' choice in learning objectives, resources and methods

  - S/he accepted feedback about her/his role

- Dimension 4- Assessing and Giving Feedback: (3 items)

  - S/he encouraged students' self-evaluations

  - S/he gave feedback to students about their studies.

To provide information about concurrent validity, students were asked to evaluate the tutors' competence using a 5-point Likert scale. The correlation between these general scores and the scores after dropping items from the scale following the factor analysis was 0.55 ($p< 0.001$). The calculated correlation coefficients between these general scores and dimension scores were 0.59, 0.55, 0.48 and 0.30 ($p< 0.001$) respectively. To provide content validity, tutors were asked to match the behaviors in the scale with the behaviors tutors should perform; the degree of agreement was evaluated using percentages and mean values of the answers. Items with a mean value higher than 3.5 (70% of the total score) were accepted, while items not meeting that criterion were dropped. The Cronbach alpha coefficients for reliability were respectively 0.90, 0.87, 0.74 and 0.77.

Statistical Analysis

Initially, scores out of 5 for each dimension were generated by summing the responses and dividing by the number of questions in each dimension. The scale score was generated in a similar way. To compare 2nd and 3rd year, the student-t test was used for students' scores and the Mann-Whitney U test for tutors' scores. To compare scores between dimensions the one-way ANOVA for repeated measures and the post-hoc Bonferroni test was used. Spearman rank correlation coefficients were used to determine the relationship between the scores of students and tutors.

RESULTS

There was no statistically significant difference between years or between the English & Turkish streams or between sexes for dimensional and total scores of HTES ($p > 0.05$) (Table 1).

The difference between the mean values for dimensions was evaluated. The mean values of the students' total scores were statistically significant ($n = 557$, $F = 46.27$, $p < 0.001$). In all dimension pairs, mean values were statistically different ($p < 0.001$) except in the evaluation of the pair, 'conducting PBL' and 'communication and supporting students' autonomy' ($p > 0.05$). The scores for 'supporting the learning process and metacognitive knowledge' and 'assessing and giving feedback' were lower than the scores for other dimensions (Table 2).

The results were similar when the group of tutors scored themselves. The difference between the mean values for dimensions in the tutors' total scores was statistically significant and similar to the scores of the students ($n = 42$, $F = 5.37$, $p < 0.002$). When the results were evaluated to define the differing groups, the difference between the mean values of 'conducting PBL' and 'supporting the learning process and metacognitive knowledge' ($p < 0.001$), and 'conducting PBL' and 'assessing and giving feedback' were found significant ($p < 0.03$). As for the students, the scores for 'supporting the learning process and metacognitive knowledge' and 'assessing and giving feedback' were lower than the scores of other dimensions (Table 2).

The correlation between the scores of students and tutors regarding the performance of the tutor role was also analyzed. There was no significant relationship between the correlation coefficients of dimensions and total scores (Table 3).

TABLE 1: Student mean scores for the realization of tutor roles, according to student characteristics.

	Supporting Learning Process and Metacognitive Knowledge			Conducting PBL			Communication and Supporting Students' Autonomy			Assessing and Giving Feedback			Total		
	n	Mean	SD**	n	Mean	SD**	n	Mean	SD**	n	Mean	SD**	n	Mean	SD**
Year*															
2	315	3.78	0.76	315	3.94	0.75	311	3.95	0.72	309	3.68	0.97	315	3.81	0.69
3	252	3.73	0.79	251	3.99	0.78	249	3.93	0.85	249	3.55	0.92	252	3.76	0.73
t		0.80			-0.82			0.22			1.58			0.53	
p		> 0.05			> 0.05			> 0.05			> 0.05			> 0.05	
Sex*															
Female	275	3.79	0.81	275	4.03	0.80	272	3.98	0.80	271	3.54	0.99	275	3.81	0.74
Male	292	3.73	0.72	291	3.90	0.74	288	3.91	0.76	287	3.70	0.91	292	3.79	0.68
t		0.84			2.00			1.12			-1.96			0.56	
p		> 0.05			> 0.05			> 0.05			> 0.05			> 0.05	
Curricular Language*															
Turkish	319	3.80	0.77	318	3.99	0.76	316	3.99	0.77	315	3.66	0.99	319	3.88	0.71
English	248	3.71	0.78	248	3.92	0.78	244	3.88	0.79	243	3.57	0.91	248	3.74	0.71
t		1.32			1.09			1.64			1.07			1.64	
p		> 0.05			> 0.05			> 0.05			> 0.05			> 0.05	

* Calculated using Student-t test.

** SD= Standard Deviation.

TABLE 2: Total scores of students and tutors for different dimensions of the scale.

Dimensions	Students n= 557		Tutors n= 42	
	Mean	SD*	Mean	SD*
1. Supporting the learning process and metacognitive knowledge	3.78	0.76	3.81	0.58
2. Conducting PBL	3.96	0.76	4.09	0.61
3. Communication and supporting students' autonomy	3.94	0.78	4.03	0.74
4. Assessing and giving feedback	3.62	0.93	3.68	1.00
	F= 46.27** p< 0.001		F= 5.37** p< 0.002	
Differing groups***	1-2, 1-3, 1-4, 2-4, 3-4 (p< 0.001)		1-2 (p< 0.001), 2-4 (p< 0.03)	

* SD= Standard Deviation.

** Calculated using one way ANOVA for repeated measures.

*** To define the differing group, a Bonferroni test was used.

DISCUSSION

All the statements received high scores, and student characteristics such as sex, year and curricular language had no effect on the results. Although the difference was not statistically significant, the total scores for female students were higher and their scores for 'assessing and giving feedback' were lower. In a number of studies, tutor-evaluation scores differ between males and females. In studies conducted by Das et al and Mpofu et al, the females had higher expectations and wanted to develop cognitive skills, whereas males desired 'individual air time'; females scored higher in the study of Das et al.[11-13]

In various studies, the characteristics of tutors were defined as facilitating the critical thinking of students who meet problems, supporting discussion, eliminating conflicts, focusing on students' directing the learning process, supporting the learning process and knowing when and how to intervene.[7,14-19] In our study, there were statistically significant differences between dimensions when the total scores of both students and tutors were evaluated. The scores for 'supporting the learning process and metacognitive knowledge' (mean values were 3.78 for students and 3.81 for tutors) and 'assessing and giving feedback' (mean values were 3.62 for students and 3.68 for tutors) were lower than the scores of other dimensions (Table 2).

'Assessment and feedback' covers determining the current situation and giving information about it. It leads to defining unattained or new goals. Stu-

TABLE 3: The correlation between the scores of students and tutors on the dimensions of the scale.

	Tutors				
Students	Supporting the learning process and metacognitive knowledge	Conducting PBL	Communication and supporting students' autonomy	Assessing and giving feedback	Total
Supporting learning process and metacognitive knowledge	r_s= 0.229 p> 0.05				
Conducting PBL		r_s= 0.132 p> 0.05			
Communication and supporting students' autonomy			r_s= 0.160 p> 0.05		
Assessing and giving feedback				r_s= 0.207 p> 0.05	
Total					r_s= 0.203 p> 0.05

dent participation in PBL sessions helps them become independent learners. Metacognition skills are important in this process. Metacognition is the learners' awareness of what and how they learn; metacognitive knowledge is used to organize the thinking and learning processes. Three basic skills are needed: planning, monitoring and evaluating.[20] Student awareness should be emphasized to produce independent learners. These two processes are important keystones in achieving the goal of PBL that students will become self-directed learners.

Most studies investigating the differences between content-expert and non-content-expert tutors conclude that the content expertise of a PBL tutor leads to more teacher-directed activities at the cost of student-initiated activities. Content expertise seems to result in a more directive role on the part of tutors and in fewer student-student interactions. Content-expert tutors found it difficult to maintain the facilitator role and tended to present and explain case material more frequently than tutors with less content expertise.[8,21] Studies on the differential influence of content expert and non-content expert tutors on student achievement reveal contradictory findings; some studies show that tutorial groups guided by content-expert or non-content-expert tutors led to equal student performance. However, other studies indicate that students guided by content-expert tutors perform better on tests than students guided by non-content-expert tutors.[8] There is no differential influence of content expert and non-content expert tutors on the evaluations of students and tutors of tutor competency.[18,21] In our study, the year II tutors were non-content-expert tutors (medical doctors from different disciplines), and the year III tutors were content-expert tutors (specialists in the content area). The results showed no statistical difference between the scores of either year II & III students or year II & III tutors. It seemed that both students' and tutors' evaluation of tutors' performance was related to supporting the learning process rather than content expertise because the lowest mean values were for the dimensions, 'supporting the learning process and metacognitive knowledge' and 'assessing and giving feedback'.

There was no statistically significant relationship between the evaluations of students and tutors. In the study by Das et al there was a negative but statistically insignificant relationship between students and tutors in total scores.[11] In our study, however, there was no concordance between the perceptions of students and tutors.

CONCLUSIONS

Tutors are important elements in the success of PBL tutorials. Periodic evaluation of tutors' professional behavior helps to determine the need for faculty development. The results of our study demonstrated that tutors required the skills and attitudes for "supporting the learning process and metacognitive knowledge" and "assessing and giving feedback".

Similar studies for different groups at different levels of their medical studies should be conducted, needs should be assessed, and continuing professional development activities should be organized. The results of this study should be shared with all tutors to stimulate new faculty development programs.

As there was no consensus on the roles of students and tutors in PBL, activities should be organized for sharing and discussing the principles of PBL, its components and the different roles. Any feedback from students will enrich the evaluation provided to tutors. Feedback from students is important and has priority for the very reasons that they are the subjects of learning and the objects of teaching.

In our study, quantitative data were gathered and evaluated. Qualitative studies would support the current results and would provide additional detailed data. Further studies on the roles of students and the quality of cases in PBL sessions would also broaden the evaluation process and improve the quality and effectiveness of PBL sessions.

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