

# Perception of the faculty regarding problem-based learning as an educational approach in Northwestern Saudi Arabia

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## ABSTRACT

**الأهداف:** تقييم المعارف والاتجاهات وممارسة طرق التعلم المتمحورة حول حل المشكلات بين أعضاء هيئة التدريس الطبية في شمال غرب المملكة العربية السعودية.

**الطريقة:** أجريت الدراسة المقطعية في كلية الطب، جامعة طبية، المدينة المنورة، المملكة العربية السعودية في بداية العام الجامعي 2014/2015 حيث بدأ العمل بطريقة التعلم المتمحورة حول المشكلات خلال تلك السنة. وقد دعي أعضاء هيئة التدريس بالكلية وعددهم 110 إلى المشاركة في هذه الدراسة. وتم جمع البيانات عن الخصائص الاجتماعية والديموجرافية للمشاركين وكذلك عن معارفهم واتجاهاتهم وممارستهم لطرق التعلم المتمحورة حول حل المشكلات عن طريق استمارة استبيان منظمة. وبعد ذلك تم تحليل البيانات باستخدام الأساليب الإحصائية المناسبة.

**النتائج:** كان معدل الاستجابة الكلي 77.3% (85 من أصل 110). وكانت نسبة أعضاء هيئة التدريس الذين لديهم معرفة جيدة بطريقة التعلم المتمحورة حول المشكلات 76.5%، وكانت النسبة الأعلى بين أعضاء هيئة التدريس الذكور (79.1%)، والأساتذة (86%)، والأساتذة المساعدين (88%). كما وجدت اتجاهات إيجابية ذات دلالة إحصائية بين أعضاء هيئة التدريس الذكور وفي الأقسام الإكلينيكية. وكانت نسبة ممارسة أعضاء هيئة التدريس لهذه الطريقة من التعلم 35% وكانت النسبة الأعلى بين أعضاء هيئة التدريس الذكور، في الأقسام الإكلينيكية، والأساتذة، والأساتذة المساعدين.

**الخلاصة:** أظهرت الدراسة وجود نسبة عالية نسبياً من أعضاء هيئة التدريس بالكلية لديهم معارف جيدة واتجاهات إيجابية نحو طريقة التعلم المتمحورة حول حل المشكلات. أخيراً توصي الدراسة بعقد دورات تدريبية من قبل الكلية لأعضاء هيئة التدريس الجدد وكذلك لأعضاء هيئة التدريس الذين لم يشاركوا من قبل في مثل هذه الطريقة من التعلم.

**Objectives:** To assess the knowledge, attitudes, and practice of medical teachers regarding problem-based learning (PBL) in Northwestern Saudi Arabia.

**Methods:** This is a cross-sectional study conducted in the College of Medicine, Taibah University, Al Madinah Al Munawarah, Kingdom of Saudi Arabia,

at the beginning of the academic year 2014/2015 where the PBL method had recently been introduced. Medical academic staff (n=110) were invited to participate in the study. Data about staff sociodemographic characteristics, PBL knowledge, attitudes, and practice were collected via a pre-designed structured questionnaire. The collected data were analyzed using appropriate statistical methods.

**Results:** The overall response rate was 77.3% (85 out of 110). The proportion of staff having good PBL knowledge was 76.5% (95% CI= 68.5%-84.5%), with the higher proportion being observed among the male staff (79.1%), professors (86%), and associate professors (88%). Significantly higher positive perceptions were found among male and clinical sciences staff. The PBL practice of the studied staff was 35%, with a statistically significant difference observed between male and female staff. Problem-based learning practice was also higher among clinical staff (42%), associate professors (40%), and professors (38%).

**Conclusion:** A considerably high proportion of the studied medical staff was found to have good knowledge and favorable attitudes towards PBL. Training courses by the college should be considered for the staffs who have not previously engaged in such learning methods, as well for the junior and new staff.

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Over the last few decades, a progressive effort has been made to change the method of medical education from traditional, didactic, lecture-based teaching to a more problem-based learning (PBL) approach.<sup>1</sup> Problem-based learning is student-centred learning, in which students learn both thinking strategies and domain knowledge. The role of teachers in this type of learning is not just to facilitate the learning process, but also to ensure that learning objectives are met.<sup>2,3</sup> Several studies have considered PBL as the most favorable method to prepare students for working in a team, to deal with problems in the future, and acquire the communication, and patient interaction skills necessary to become active self-directed learners, rather than passive recipients of information.<sup>4,7</sup> Unlike traditional teaching, PBL helps students acquire the skills of integrated knowledge delivery and information processing, and promote their active participation.<sup>7</sup> In the Kingdom of Saudi Arabia, certain medical schools are turning to PBL; this is a strategy used in integrated, community-oriented curricula, with the goal of enhancing the knowledge and professional skills of students. In the last decade, the Aljouf University of Sakakah, the King Saud University of Riyadh, and the King Abdulaziz University of Jeddah have started using PBL for their entire medical program.<sup>8-10</sup> The trend is now to embed the PBL approach in all the medical faculties of Saudi Arabia, including the College of Medicine at Taibah University in Madinah. Implementing such a method in medical education not only requires trained human resources, but also a number of preparatory steps, including much planning and organization. An essential step in this process is the preparation and engagement of the faculty so that academics and clinicians become aware of the rationale for the change and work as part of a team in the construction of the new program.<sup>7,10-12</sup> Investigating the experience of medical teachers in this method of education is also necessary, and this may encourage the faculty administration to organize PBL training for teachers who have not previously engaged in such a learning method in order to ensure the successful implementation of this approach. Since the College of Medicine at Taibah University planned to implement this approach in the medical educational curricula by the academic year 2014/2015 and since medical teachers would be involved and represent the central position in implementing such a program, it is necessary to review their current background in PBL education. From this point of view, this study aimed to assess the knowledge, attitudes and practice of medical teachers at the College of Medicine at Taibah University regarding PBL.

### **Methods.** *Study setting and sampling procedure.*

This cross-sectional study was conducted at the College of Medicine, Taibah University, Al Madinah Al Munawarah, Saudi Arabia, to assess the knowledge, attitudes, and practice of medical teachers regarding PBL. All medical teachers from the different faculty departments (n=110) at the end of academic year 2014/2015 were invited to participate in this study. Participation in this study was voluntary. The privacy and confidentiality of data were considered as the data were collected and manipulated anonymously. Permission was also received from the Deanship of Scientific Research and the Faculty's Ethical Committee to carry out this study. Teachers who agreed to participate in this study were asked to complete a pre-designed structured questionnaire. The questionnaire was developed according to the findings of previous studies and was reviewed and validated by medical education experts and an epidemiologist. Sociodemographic data and identification characteristics were included in the study questionnaire. Sociodemographic data included age of participant, gender, highest educational level, current job title, and departmental affiliation. The questionnaire also included data about knowledge, attitudes and practice regarding PBL. The study questionnaires were distributed manually to medical teachers through the head of each department in the faculty by the researcher himself.

**Assessment of knowledge.** Knowledge was assessed based on 20 questions, with 3 answers for each question ('yes', 'no' and 'do not know'). For simplicity, 'no' and 'do not know' answers were categorized as 'no'. These 20 questions were then classified into 2 main parts representing PBL: (1) the concept of PBL, which was represented by 12 questions and included items about PBL definition and objectives, problem-solving, teamwork, delivery of integrated knowledge, and active learning, and (2) the evaluation of student performance, and the evaluation process, represented by 8 questions. Each knowledge item for the studied parts was then scored as follows: 'yes' = 1, and 'no' = 0. The knowledge representing each part of PBL, as well as for total knowledge, were assessed and categorized into 'good', 'fair' and 'poor', according to the knowledge score given for each item. Good knowledge was defined as the respondent answering 'yes' at more than 75%, fair knowledge was 50-75%, and poor knowledge was less than 50%.

**Assessment of attitudes.** Attitudes towards PBL were assessed using a Likert response scale from 1 to 5 (1= completely disagree; 2= disagree; 3= neutral; 4= agree, and 5= completely agree). The attitude section included 12 statements representing all aspects of PBL.

The item and scale score are reported in the range +1 to -1. The midpoint 0 corresponds to the neutral Likert scale rating of 0, +1 corresponds to 'completely agree' and 'agree', and -1 corresponds to 'completely disagree' and 'disagree'. Accordingly, the 12 attitude items in the study questionnaire have a maximum score of +12 and a minimum score of -12. A mean score for all studied attitude items was then calculated from the individual scores.

**Statistical analysis.** The collected data were entered and analyzed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA). Data were presented using frequencies, means and standard deviation (SD). The teachers' knowledge, attitudes and practice were assessed, analyzed and compared by the studied teachers' identification data (academic versus clinical, professors versus associate and assistant professors, and male versus female) using unpaired Student's t-test (for normally distributed data) and Chi-squared tests (for nonparametric data). *P*-values of  $\leq 0.05$  were used as a level of statistical significance.

**Results.** A cohort of 110 medical staff (56 male and 54 female) at the College of Medicine, Taibah University, Madinah, Saudi Arabia were enrolled in this study to assess their knowledge, attitudes, and practice regarding PBL. The response rate for participation in this study was 76.8% among male (43 out of 56) staff and 77.8% among female staff (42 out of 54), with an overall response rate of 77.3% (85 out of 110).

Table 1 presents the identification data of the studied staff. The mean age ( $\pm$ SD) of the studied staff

was  $46.6 \pm 7.7$  years, and of them, 50.6% were male and 49.4% were female. Approximately two-thirds (61.2%) of the studied staff were from the basic sciences department, and more than half of the studied staff (55.3%) have a PhD. The percentage distribution of the studied staff by current job title was 34.1% professors, 29.4% associate professors, and 36.5% assistant professors.

Table 2 displays the knowledge of staff regarding all studied items of PBL according to their characteristics. More than three-quarters (76.5%) of all studied staff were found to have good knowledge regarding all studied items of PBL. Studying the knowledge of staff about items of PBL by their characteristics revealed no statistically significant differences regarding staff gender, department, or job title, although the level of

**Table 1** - Characteristics of medical teachers from different faculty departments at the end of academic year 2014/2015 (N=110).

Characteristics*	n (%)
Staff age in years, mean $\pm$ SD (range)	46.6 $\pm$ 7.7 (30, 60)
<b>Staff gender</b>	
Male	43 (50.6)
Female	42 (49.4)
<b>Department</b>	
Basic sciences (academic)	52 (61.2)
Clinical sciences	33 (38.8)
<b>Highest education level</b>	
PhD	47 (55.3)
MD	38 (44.7)
<b>Current job title</b>	
Professor	29 (34.1)
Associate Professor	25 (29.4)
Assistant Professor	31 (36.5)
25 of the medical teachers showed no response	

**Table 2** - Knowledge of staff regarding all studied items of problem-based learning according to their characteristics (N=110).

Variables	Level of knowledge			<i>P</i> -value
	Good	Fair n (%)	Poor	
All subjects	65 (76.5)	18 (21.2)	2 (2.3)	-
<b>Gender</b>				
Male	34 (79.1)	9 (20.9)	0 (0.0)	0.53
Female	31 (73.8)	9 (21.4)	2 (4.8)	
<b>Department</b>				
Basic sciences	38 (73.1)	12 (23.1)	2 (3.8)	0.56
Clinical sciences	27 (81.8)	6 (18.2)	0 (0.0)	
<b>Highest education level</b>				
PhD	32 (68.1)	13 (27.7)	2 (4.3)	0.09
MD	33 (86.8)	5 (13.2)	0 (0.0)	
<b>Job title</b>				
Professor	25 (86.2)	3 (10.3)	1 (3.5)	0.01*
Associate professor	22 (88.0)	2 (8.0)	1 (4.0)	
Assistant professor	18 (58.1)	13 (41.9)	0 (0.0)	
*Significant. Fischer exacts tests were used. <i>P</i> -value was considered significant at 0.05. 25 of the medical teachers showed no response				

good knowledge was higher among male staff, clinical sciences staff, and those reported to have an MD degree. A statistically significant difference, however, was found regarding the level of knowledge according to current job title of the studied staff, where the highest level of good knowledge was found among associate professors (88%), followed by professors (86.2%). Although assistant professors have the lowest percentage of good knowledge, they were found to have 0% of poor knowledge.

Table 3 shows the distribution of the studied staff in the PBL attitude scale. The studied staffs report a high percentage of 'agree' and 'completely agree' towards almost the studied attitude items. More than 85% of the studied staff reported that they 'agree' and 'completely agree' for the first, second, sixth, eighth, ninth, and tenth PBL attitude items. Approximately two-thirds of

the studied staff, however, reported that they 'agree' and 'completely agree' for the other studied attitude items.

Table 4 presents the average attitude score among the studied staff by characteristic. The average attitude score was significantly higher among male, clinical sciences staff, and those with an MD degree. Although the average attitude score was higher among associate professors (9.8 ± 4.0) compared with professors (8.5 ± 5.3) and assistant professors (6.9 ± 5.3), there is no statistically significant difference.

Table 5 shows the distribution of the studied staff according to their practice of PBL. There is a statistically significant difference between male and female staff regarding their practice of PBL, where 49% of male and only 21% of female report that they had practiced PBL previously. Although not significant, there are also differences in staff practice of PBL by their department, highest education levels, and job title. The higher

**Table 3** - Frequency distribution of the studied staff in the problem-based learning (PBL) attitude scale.

Attitude items*	1	2	3 %	4	5
1. PBL is better than a traditional teaching method	4.7	4.7	29.4	30.6	30.6
2. PBL helps students to perform problem searching	4.7	3.5	4.7	29.4	57.7
3. PBL helps students to perform problem solving	3.5	4.7	5.9	29.4	56.5
4. PBL helps students to perform initiative learning	3.5	5.9	14.1	29.4	47.1
5. PBL helps students to share professional knowledge	5.9	1.2	12.9	34.1	45.9
6. PBL helps students to think correctly in a problem	3.5	3.5	16.5	23.5	53.0
7. PBL helps students to perform writing up medical notes	4.8	4.8	15.7	34.9	39.8
8. PBL helps students to acquire clinical and communication skills	3.5	4.7	5.9	23.5	62.4
9. PBL helps students work in a team	4.7	2.4	3.5	20.0	69.4
10. PBL establishes interaction with peers	3.5	5.9	4.7	29.4	56.5
11. PBL establishes patient doctor relationships	3.5	3.5	18.8	22.4	51.8
12. PBL would result in a better doctor on graduation	3.6	7.1	27.4	25.0	36.9

\*1 - completely disagree, 2 - disagree, 3 - neutral, 4 - agree, 5 - completely agree

**Table 4** - Average attitude score among the studied staff according to their characteristics (N=110).

Staff characteristics	Mean ± SD	P-value
<i>Staff gender</i>		
Male	9.5 ± 4.3	0.001*
Female	7.3 ± 6.8	
<i>Staff department</i>		
Basic sciences	7.1 ± 5.3	0.001*
Clinical sciences	9.2 ± 4.5	
<i>Highest education level</i>		
PhD	7.7 ± 6.5	0.03*
MD	9.1 ± 4.6	
<i>Staff job title</i>		
Professor	8.5 ± 5.3	0.15
Associate professor	9.8 ± 4.0	
Assistant professor	6.9 ± 5.3	

\*Significant. Unpaired t tests were used. P-value was considered significant at 0.05. 25 of the medical teachers showed no response

**Table 5** - Distribution of the studied staff according to their characteristics and problem-based learning (PBL) practice (N=110).

Characteristics	PBL practice		P-value
	Yes (n=30)	No (n=55)	
<i>Staff gender</i>			
Male	21 (49.0)	22 (51.0)	0.01*
Female	9 (21.0)	33 (79.0)	
<i>Staff department</i>			
Basic sciences	16 (31.0)	36 (69.0)	0.07
Clinical sciences	14 (42.0)	19 (58.0)	
<i>Highest education level</i>			
PhD	16 (34.0)	31 (66.0)	0.79
MD	14 (37.0)	24 (63.0)	
<i>Staff job title</i>			
Professor	11 (38.0)	18 (62.0)	0.55
Associate professor	10 (40.0)	15 (60.0)	
Assistant professor	9 (29.0)	22 (71.0)	

\*Significant. Chi square tests were used. P-value was considered significant at 0.05. 25 of the medical teachers showed no response



proportion of staff practicing PBL was found among clinical sciences staff (42% versus 31% in basic sciences staff), staff with an MD degree (37% versus 34% in staff with a PhD), and among associate professors (40%), and professors (38%).

**Discussion.** The present study evaluates the knowledge, attitudes and practice of medical staff at the College of Medicine, Taibah University, Madinah, Saudi Arabia. The study demonstrated a relatively high percentage of good knowledge (76.5%) of all items of PBL among the studied staff. Although not significant, the level of PBL knowledge was higher among male staff (79.1%), clinical sciences staff (81.8%), and MD staff (86.8%). Also, the professors and associate professors showed a significantly higher level of knowledge compared to assistant professors.

In the recent review of the literature, the available studies assess knowledge and attitudes regarding PBL among undergraduate students,<sup>13</sup> and most of these studies, conducted in Europe and Asia, have stressed the impact of PBL on the behavior and attitudes of students, signifying the positive impact of the PBL curriculum in improving the competency, and professional skills of medical students. The results of a large cross-sectional student study conducted in 8 nursing colleges in Hunan Province, China, revealed that 41.2% had not heard of PBL and 58.8% had heard of it. Of the 610 students who had heard of PBL, 54.4% knew it was a teaching method, but they did not know its specific content. Roughly 3 out of 10 students (30.3%) knew the meaning of PBL, and 15.2% of the students who had heard of PBL were familiar with its format and concepts. More than 8 out of 10 students (82%) who knew of PBL said the main way they learned about it was from teachers who introduced PBL into their courses, while 16.3% of students gained their knowledge of PBL through communicating with classmates. A small number of students (2%) learned on PBL through books, other literature, or the internet.<sup>14</sup>

The finding that a relatively low level of good knowledge (58.1%) was observed among the assistant professors (namely, junior staff) compared to the level among professors (86.2%) and associate professors (88%), means that the implementation of PBL training courses should be mandatory to overcome this for junior staff as well as for new staff. Implementing PBL requires 5 preparatory stages and, because of the key role of the facilitators in the first preparatory stage in PBL, it was obvious that major effort needs to be put into the preparation of facilitators through training courses, particularly for the junior and new staff.<sup>10</sup>

The study findings revealed that the attitudes of the studied staff were favorable for almost all studied PBL attitude scale items; more than 85% of the studied staff report that they 'agree' and 'completely agree' regarding the second item ('PBL helps students to perform problem searching'), the sixth item ('PBL helps students to think correctly in a problem'), the eighth item ('PBL helps students to acquire clinical and communication skills'), the ninth item ('PBL helps students work in a team'), and the tenth item ('PBL establishes interaction with peers'). For the other PBL attitude items studied, about two-thirds of the studied staff agreed with these items. All these findings were more marked and significant among male and clinical sciences staff (data not shown). Furthermore, the average attitude score was significantly higher among male staff ( $9.5 \pm 4.3$ ) compared with female staff ( $7.3 \pm 6.8$ ), and among clinical sciences staff ( $9.2 \pm 4.5$ ) compared with basic sciences staff ( $7.1 \pm 5.3$ ). Moreover, there is a higher mean score among associate professors and professors compared with assistant professors, although not significant. Consistent with these findings, the results of a study conducted in Mymensingh Medical College in Bangladesh revealed that approximately 69% of faculty members agreed that PBL enhances self-directed learning, and 64% of faculty members agreed that they will welcome PBL in clinical teaching.<sup>15</sup> Fong et al,<sup>16</sup> in their study in Hong Kong, reported that the participating teacher educators agreed to the 6 learning outcomes of PBL: 1) authentic learning; 2) use of prior knowledge; 3) student-centred learning; 4) collaborative learning; 5) independent learning, and 6) deep-learning enhancement. In continued clinical nursing education, a cross-sectional study, which included 40 clinical nurses, revealed that 57.5% of the participants responded positively to the use of PBL in continuing nurse education in terms of self-motivated and cooperative learning, whereas 20% of the participants answered that the PBL method was not suitable for clinical nurses.<sup>17</sup> In the present study, the practice of PBL was found to be 35% among the studied staff. A higher proportion of staff reporting previous practice of PBL was observed among male staff (49%), clinical sciences staff (42%), staff with an MD degree (37%), and among associate professors (40%) and professors (38%). Although this seems a low percentage of PBL practice among the studied staff, more than 90% of them have endorsed the use of this new approach in the studied college. These findings appear consistent with the results of the above-mentioned perception studies, where the members of staff who showed a high proportion of PBL practice were previously found to have a high proportion of

good knowledge as well as a positive perception of PBL. Although PBL has been implemented and assessed in many medical school programs all over the world, as well as in Saudi Arabia, few studies have focused on the attitudes of medical staff and their perceptions of PBL. Most of these studies assessed student perception of PBL. Of these studies, a recent research<sup>18</sup> was conducted at the College of Medicine, King Faisal University, Al Hasa, Saudi Arabia, and aimed to assess whether student perception of a short module of PBL changed with time as they moved to further years of study. Two groups of students, who had been exposed to a short 6 week module of PBL, were compared one and 2 years after completing the modules. Attitudes and perceptions were compared using a 5 point Likert-scale questionnaire. Both groups showed a positive perception of the PBL process, especially with regard to areas, such as developing communication skills and motivation to study. The obtained positive attitude seen from a short course of PBL did not change with time as students proceeded to further years of study.<sup>18</sup>

The present study appears to have a number of strengths, including a relatively high response rate, which consolidated the study findings. The study questionnaire was comprehensive and addressed almost all PBL items concerning its definition, objectives, problem-solving, teamwork, delivery of integrated knowledge, active learning, and evaluation of student performance. Moreover, the study questionnaire had been validated by medical education experts. To the best of the available knowledge, this research was the first to study knowledge, attitude and practice regarding PBL among medical staff in Saudi Arabia. The current study did not just evaluate the awareness levels of college staff of PBL, but also compared the knowledge, attitude and practice of the studied staff by their gender, department, highest education level, and current job title.

**Study limitations.** Self-selection bias may have been a limiting factor in this study because those subjects who chose to participate may be more familiar with PBL than those who refused to be contacted. However, due to the low refusal rate encountered in this study, this factor appears to have no role in the study findings. The study included staff from one medical college and recruited a modest sample size; future research will need to include a multi-college design to assess the extent to which the results of this study can be generalized.

In conclusion, the present study revealed a relatively high proportion of medical staff at the College of Medicine, Taibah University, to have good knowledge of, and favorable attitudes towards PBL. However, the percentage of the staff who reported a previous practice of PBL was low (35%). Since the College of Medicine

at Taibah University started introducing PBL in their curricula in the academic year 2014/2015, and since college medical teachers are involved and represent the central position in implementing such a program, dissemination of this study findings is important for the college staff to know the current background to the newly introduced PBL program. Training courses by the college are recommended for staff not previously engaged in such learning method as well for junior and new staff.

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