

## *Students' Perception of PBL Facilitation Skills*

# Faculty Members versus Teaching Assistants as Problem-Based Learning (PBL) Facilitators: Medical Students' Perception

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### Abstract

Problem-Based Learning (PBL) is a student-centered pedagogy that depends on the principle of using real life problems as a trigger for the acquisition and integration of new knowledge through the problem-solving skills and experiences. The PBL allows medical students to develop important skills and attributes. Among the pillars of successful PBL implementation is the 'class tutor'. The PBL tutor is known as the guide or mentor for the students. Tutors prompt students with metacognitive questions and provide direction without directly telling the student what to look for and where to go for information. The aim of the study was to compare the performance of faculty members and teaching assistants in facilitating PBL sessions from the students' points of view. A comparative, cross-sectional study was conducted on ISNC medical students who attended PBL sessions with both faculty members and teaching assistants in various integrated modules. A questionnaire designed by the researchers and transformed into an online survey (through Google Forms) has been used for data collection. The descriptive statistics have been used and a p-value < 0.05 was considered as statistically significant. A total of 348 medical students responded to the questionnaire. The data collection tool was based on a questionnaire that was analyzed for its validity and reliability and showed a high validity reflected by KMO and Barlett's test of Sphericity with a value of 0.908 (p < 0.000) and high reliability reflected by Cronbach's alpha with a value of 0.928. The study participants reported that 63.5% and 79.6% of faculty members and teaching assistants, respectively, had sufficient to high performance, while 36.5% and 20.4% of faculty members and teaching assistants, respectively, had a poor or insufficient performance. No association was found between students' perception of the facilitation performance of faculty members & teaching assistants and their demographic data. The perception of the medical students of the PBL facilitation skills of teaching assistants was more positive than the skills of faculty members. Teaching assistants are suitable PBL facilitators probably because they have a better understanding of students' needs than faculty members, being closer to them in age or their recent experience as undergraduate medical students.

**Keywords:** Faculty Members, Medical Students, Teaching Assistants, PBL

## 1. Introduction

Problem-based learning (PBL) was pioneered by Barrows and Tamblyn from the Faculty of Medicine at McMaster University in 1968<sup>1</sup>. PBL has been utilized for over 40 years in a variety of different disciplines and has had a major impact on medical education practices<sup>2,3</sup>. PBL is defined by Amin and Hoon as a method of learning that challenges the students to 'learn to learn' through cooperating in groups to reach solutions to real problems<sup>4</sup>. PBL is a student-centered method in which participants are assigned in groups of 8 to 12 students guided by a facilitator and given tasks in the form of real-life problems relevant to those that they will face in the field of practice after graduation. Through this approach, students acquire new knowledge and skills and are expected later to apply such knowledge and skills to reach to practical solutions for similar problems<sup>5</sup>.

Among the pillars of successful PBL implementation is the 'class tutor'<sup>6</sup>. The PBL class tutor works as the guide for the students in the group. Tutors use their facilitation skills to prompt their students with metacognitive questions relevant to the problem under discussion. They provide the students with direction without lecturing them or directly telling them what to look for. The tutor is responsible for creating a student-centered learning environment in the classroom through promoting directed self-learning, stimulating the integration of students' previous knowledge, encouraging interaction between students, and providing guidance on the learning process<sup>7,8</sup>.

To optimize the PBL process, tutors play an important role during sessions, through which they facilitate student-centered, self-directed learning and encourage the students to do brainstorming for problem-solving<sup>9</sup>. A tutor should identify the extent of students' prior knowledge and any misconceptions regarding it after a problem has been analyzed<sup>10</sup>. Because of the high demand of tutors in each PBL session that would be both time- and labor-intensive on the faculty members, it was necessary and helpful to train Teaching Assistants (TAs) to facilitate PBL sessions. The TAs position is designed for the recent medical graduates who have substantial academic knowledge and leadership qualities required to facilitate the learning of medical students and have enough time immediately after graduation to be dedicated to this position<sup>11</sup>.

Ibn Sina National College for Medical Studies (ISNC) is the first private medical college in the Kingdom of Saudi Arabia. ISNC encompasses four health professions education programs (Medicine, Dentistry, Pharm D and Nursing). The Medicine program runs an integrated curriculum that has systems-based modules, integration and PBL. The PBL at ISNC is implemented in a hybrid manner as one of the educational strategies of the integrated system-based modules. In this study, we compared between the performance of faculty members and teaching assistants in facilitating PBL sessions from the students' points of view.

## 2. Methodology

### 2.1 Study Type and Setting

This is a comparative, cross-sectional study that was conducted on male and female medical students of the curriculum years 3, 4, 5, and 6 of the Medicine Program of ISNC. Those are the students who experienced PBL sessions with both faculty members and teaching assistants in various integrated modules.

### 2.2 Sample

Sample size was calculated as 210 students by the equation of Dawson-Saunders and Trapp<sup>12</sup> using a 4% margin of error, a confidence interval of 95%, and a population size of 1000, with an expected response of 50%. However, the questionnaire was distributed to the entire students' batches, and 348 students has responded and filled in the questionnaire.

### 2.3 Instrument

The instrument used for data collection from the study participants was a questionnaire that was developed by the researchers after an extensive review of literature and similar studies which include items that address the perception of medical students of the performance of PBL tutors in relation to the different facilitation skills. The developed questionnaire contained 11 items.

The overall impression of the students toward faculty members and teaching assistants as PBL facilitators was determined through asking the students to give a score of 1 to 10 to faculty members and teaching assistants. A score of 5 or less was considered as "poor or insufficient"

performance, while 6 or more was considered as “sufficient to high” performance.

To determine the suitability of the questionnaire, validity and reliability studies were conducted. Validity was established through Exploratory Factor Analysis (EFA). Reliability was measured through Cronbach’s alpha test.

## 2.4 Data Collection

The questionnaire was converted into an electronic format through Google Forms. The link was communicated to all Medicine Program Year 3, 4, 5, and 6 students through different social media platforms.

## 2.5 Statistical Analysis

Data was entered into the Statistical Package for Social Sciences (SPSSv.25)<sup>13</sup> and descriptive analysis was conducted. The results are reported as percentage or means with standard deviations. Association of different variables are evaluated using univariate logistics.

## 2.6 Ethical Considerations

The Ethical clearance for the study was obtained from the ISNC Research and Ethics Committee (IEC Ref No.: H-16-13082020). All the participants were informed about the purpose of the study and their right to refuse participation. Ethical conduct was maintained during data collection and throughout the research process in accordance with the Helsinki Declaration<sup>14</sup>. Participation in the study was voluntary and the confidentiality of the participants was maintained as the questionnaire was provided anonymously. Each participant had the right

to withdraw from the study at any point without any consequences.

## 3. Results

### 3.1 Validity and Reliability Studies of the Instrument

#### 3.1.1 Exploratory Factor Analysis (EFA)

The collected responses were 348, which was adequate for analysis. Using Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett’s Test of Sphericity (Table 1) revealed a value of 0.908. This value indicated that there were sufficient items predicted by each factor. Furthermore, Bartlett’s test of sphericity was statistically significant ( $p < 0.000$ ), which indicated that the variables were significantly correlated. Therefore, this output indicated the appropriateness of the data for factor analysis.

Factor extraction revealed that the 11 items of the questionnaire could be grouped under three factors with an eigenvalue  $> 1.00$ . The three factors that emerged from factor analysis accounted for 66.19% of the total variance.

Results of factor rotation showed that none of the 11 items of the survey was removed. This was based on finding that all the factors had three or more items and all items had a loading of  $> 0.30$  on relevant factor.

The factors were named according to the heaviness of loading of the statements (items) on each factor and based on the idea behind the statement (Table 2) as follows:

- Factor 1 explained 46.872% of the variance in responses, with an eigenvalue of 10.312. Four items

**Table 1.** Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett’s Test of Sphericity

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>	0.908
<b>Approx. Chi-Square</b>	5742.749
<b>Bartlett’s Test of Sphericity</b>	
<b>Df</b>	231
<b>Sig.</b>	0.000*

\*Statistically significant

**Table 2.** Factor loadings of items under the three factors (using Principal Components Analysis)

No.	Evaluation Items	Components		
		Factor 1	Factor 2	Factor 3
<b>Factor label: In-class activities during the tutorials:</b>				
1	The tutor encouraged us to independently identify the learning issues	0.799		
2	The tutor helped us find links between different issues discussed in the tutorial session	0.789		
3	The tutor guided us to summarize what we had learned in our own words	0.779		
4	The tutor helped us comprehend the theories and mechanisms underpinning different studied phenomena	0.736		
<b>Factor label: Personal and interpersonal issues:</b>				
5	The tutor encouraged us to consistently evaluate cooperative group work		0.735	
6	The tutor showed clear understanding of his/her strengths/weaknesses as a PBL tutor		0.677	
7	The tutor encouraged everyone to provide constructive feedback on our performance during group work		0.662	
8	The tutor showed high enthusiasm to do his/her role as a PBL tutor		0.640	
<b>Factor label: Searching for and applying information:</b>				
9	The tutor stimulated us to use our knowledge in the discussed problem			0.773
10	The tutor encouraged us to independently search in different resources			0.764
11	The tutor stimulated us to apply what we have learned to similar problems			0.699

loaded on this factor. This factor has been renamed to ***“In-class activities during the tutorials”***.

- Factor 2 explained 12.008% of the variance in responses, with an eigenvalue of 2.642. Four items loaded on this factor. This factor has been renamed to ***“Personal and interpersonal issues”***.
- Factor 3 explained 7.307% of the variance in responses, with an eigenvalue of 1.608. Three items loaded on this factor. This factor has been renamed to ***“Searching for and applying information”***.

### 3.1.2 Test of Reliability

Test of internal consistency (reliability) revealed a highly reliable tool with a Cronbach’s alpha value of 0.928.

#### 3.1.2.1 Quantitative Analysis of the Collected Data

Three hundred eighty-four students completed the questionnaire. About two-thirds of the respondents (64.9%) were females. The percentage of Year 5 students were the largest among all other study years (28.2%).

**Table 3.** Demographic characteristics of study participants (n=348)

Demographic Criteria	Frequency
<b>Study Year</b>	
Year 3	91 (26.1%)
Year 4	65 (18.7%)
Year 5	98 (28.2%)
Year 6	94 (27%)
<b>Gender</b>	
Female	226 (64.9%)
Male	122 (35.1%)
<b>Previous GPA</b>	
4 – 5	208 (59.8%)
3 – < 4	119 (34.2%)
< 3	21 (6%)

**Table 4.** Frequencies of responses of the study participants to the questionnaire items ( $n=348$ )

No.	Evaluation Items	Faculty Members			Teaching Assistants			Chi <sup>2</sup>	p-value
		Agree	Not Sure	Disagree	Agree	Not Sure	Disagree		
<b>In-class activities during the tutorials:</b>									
1	The tutor encouraged us to independently identify the learning issues	163 (46.8%)	81 (23.3%)	104 (29.9%)	191 (54.9%)	86 (24.7%)	71 (20.4%)	74.5	0.000*
2	The tutor helped us find links between different issues discussed in the tutorial session	153 (43.9%)	101 (29%)	94 (27%)	207 (59.4%)	89 (25.6%)	52 (15%)	93.5	0.000*
3	The tutor guided us to summarize what we had learned in our own words	106 (30.5%)	140 (40.2%)	102 (29.3%)	199 (57.2%)	94 (27%)	55 (15.8%)	74.3	0.000*
4	The tutor helped us comprehend the theories and mechanisms underpinning different studied phenomena	131 (37.6%)	106 (30.5%)	111 (31.9%)	180 (51.7%)	93 (26.7%)	75 (21.5%)	41.0	0.000*
<b>Personal and interpersonal issues:</b>									
5	The tutor encouraged us to consistently evaluate cooperative group work	109 (31.3%)	94 (27%)	145 (41.7%)	141 (40.5%)	90 (25.9%)	117 (33.6%)	17.2	0.004*
6	The tutor showed clear understanding of his/her strengths/weaknesses as a PBL tutor	92 (26.4%)	114 (32.8%)	142 (40.8%)	145 (41.7%)	102 (29.3%)	101 (29%)	16.0	0.007*

Table 4 Continued

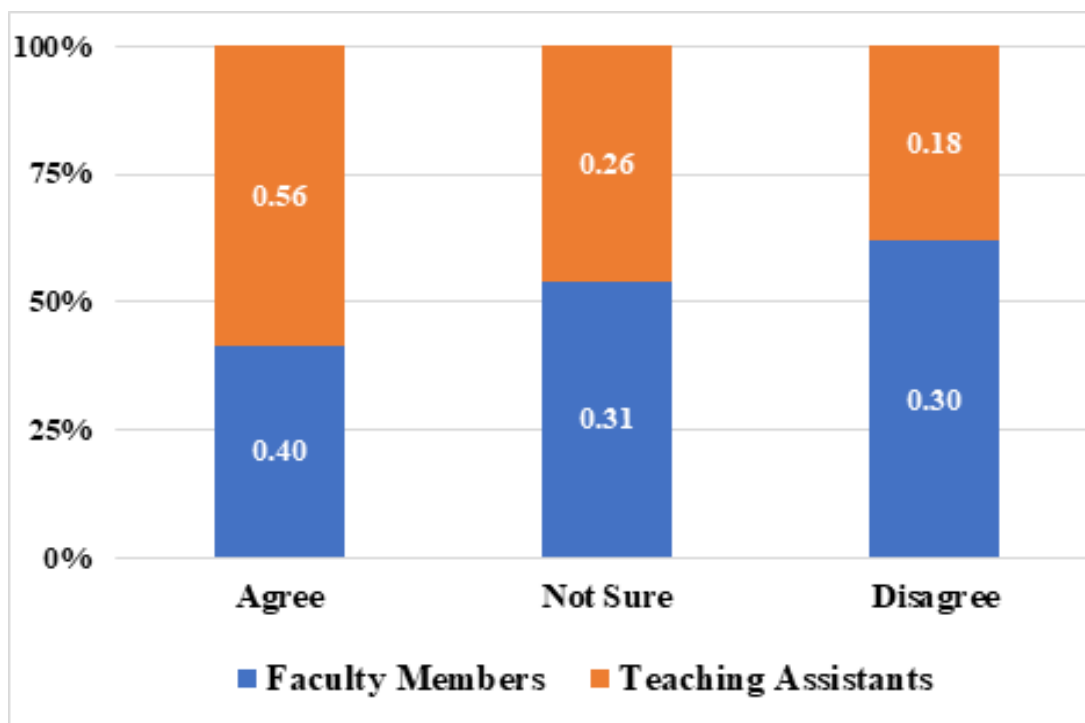
7	The tutor encouraged everyone to provide constructive feedback on our performance during group work	103 (29.6%)	108 (31%)	137 (39.4%)	144 (41.3%)	86 (24.7%)	118 (33.9%)	15.3	0.009*
8	The tutor showed high enthusiasm to do his/her role as a PBL tutor	129 (37.1%)	107 (30.7%)	112 (32.2%)	203 (58.3%)	90 (25.9%)	55 (15.8%)	75.2	0.000*
<b>Searching for and applying information:</b>									
9	The tutor stimulated us to use our knowledge in the discussed problem	157 (45.1%)	112 (32.2%)	79 (22.7%)	183 (52.5%)	101 (29%)	64 (18.4%)	66.3	0.000*
10	The tutor encouraged us to independently search in different resources	182 (52.3%)	79 (22.7%)	87 (25%)	199 (57.2%)	88 (25.3%)	61 (17.5%)	105.0	0.000*
11	The tutor stimulated us to apply what we have learned to similar problems	126 (36.2%)	112 (32.2%)	110 (31.6%)	160 (45.9%)	88 (25.3%)	100 (28.7%)	19.5	0.002*

More than half of the participants (59.8%) had a previous GPA of 4 to 5 (Table 3).

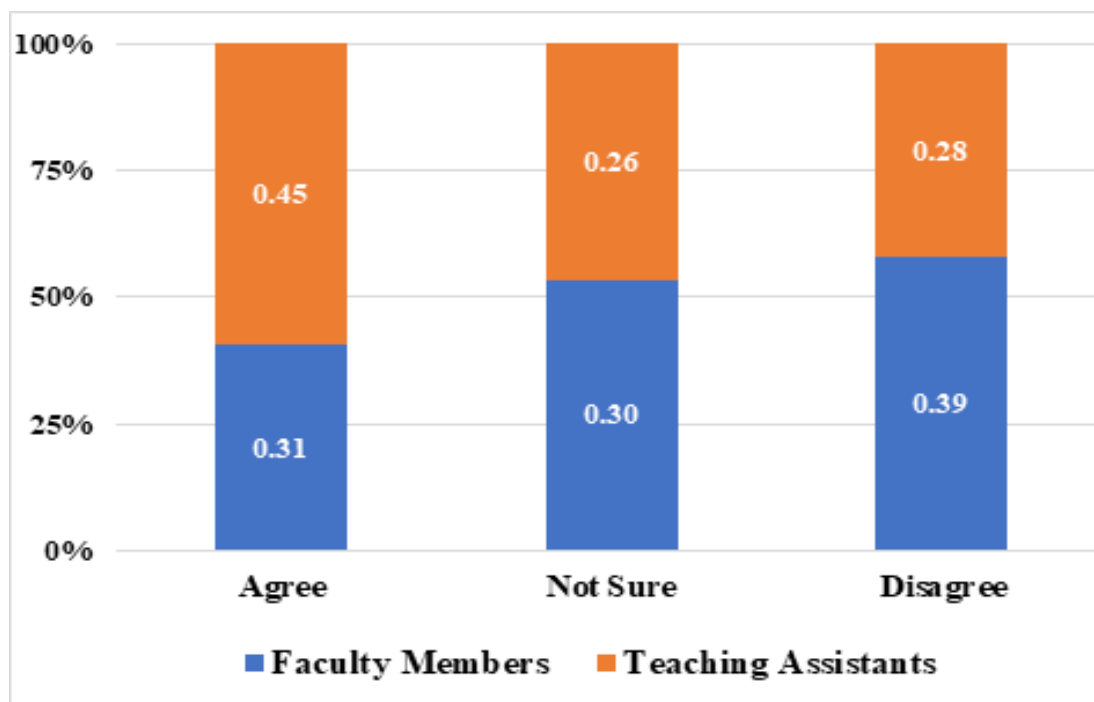
The same questions were asked to the students in the questionnaire to investigate the performance of faculty members and teaching assistants to compare the performances of the two groups.

Table 4 shows the frequencies of responses of the students to each statement in the survey. It shows that the perception of the students is more positive towards the teaching assistants. All the differences are statistically significant ( $p < 0.05$ ).

Figures 1–3 show the comparison of students' perception of faculty members' and teaching assistants'

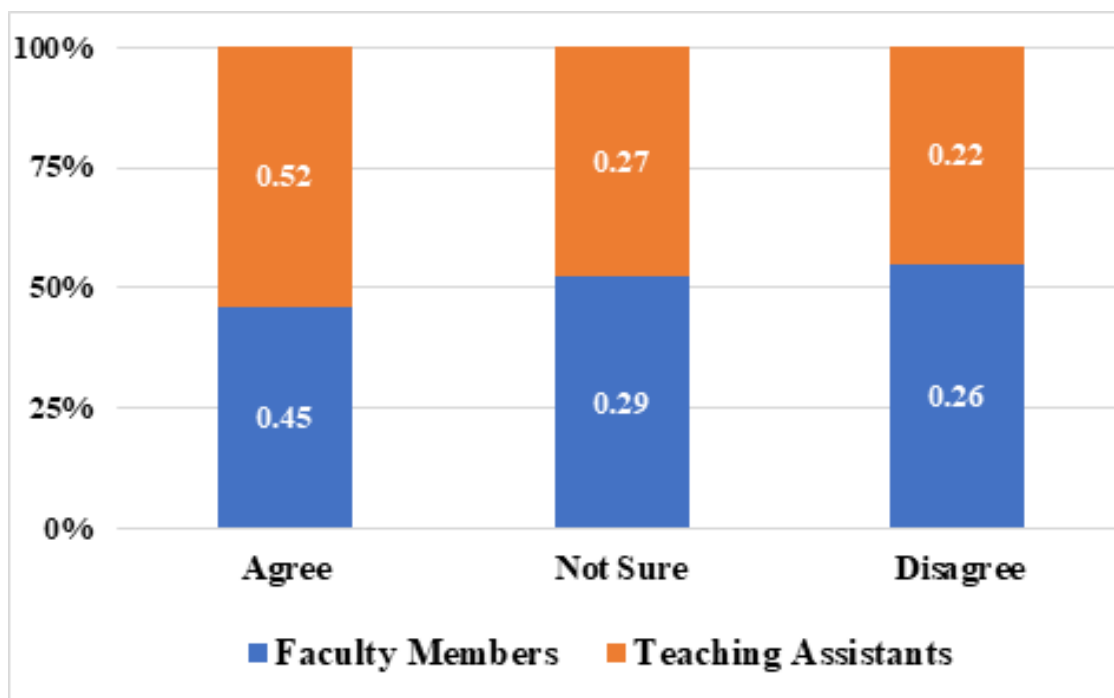


**Figure 1.** Comparison of students' perception of faculty members' and teaching assistants' facilitation skills related to "In-class activities during the tutorials" (n=348).

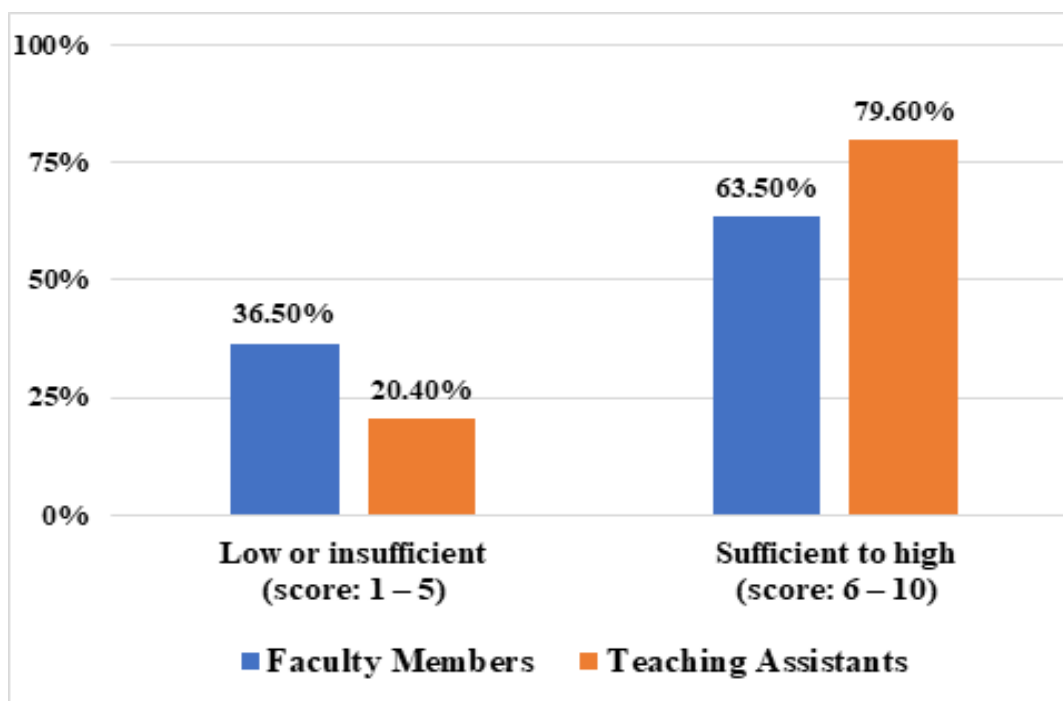


**Figure 2.** Comparison of students' perception of faculty members' and teaching assistants' facilitation skills related to "Personal and interpersonal issues" (n=348).





**Figure 3.** Comparison of students' perception of faculty members' and teaching assistants' facilitation skills related to "Searching for and applying information" (n=348).



**Figure 4** Comparison of the level of performance of faculty members versus teaching assistants as reported by the students (n=348).

facilitation skills related the three factors identified from factor analysis: namely "In-class activities during the tutorials", "Personal and interpersonal issues", and "Searching for and applying information". It is shown that the study participants perceived the facilitation skills of the teaching assistants more positive than those of faculty members in all evaluated domains.

The comparison of the overall performance of the faculty members and teaching assistants are shown in

Figure 4. More teaching assistants (79.6%) than faculty members (63.5%) have *sufficient to high*-performance as reported by the students.

Tables 5 and 6 show the demographic criteria as factors that might affect the perception of the students of the PBL facilitation skills of both faculty members and teaching assistants. There were no significant differences regarding reporting high and low performance of faculty

**Table 5.** Factors affecting students' perception of the performance of faculty members as PBL facilitators ( $n=348$ )

Variables	Faculty Members Performance		Chi <sup>2</sup>	<i>p</i> -value
	Sufficient to High	Low or Insufficient		
<b>School Year</b>				
Year 3	41 (45.1%)	50 (54.9%)	2.71	0.44
Year 4	21 (32.3%)	44 (67.7%)		
Year 5	37 (37.8%)	61 (62.2%)		
Year 6	36 (38.3%)	58 (61.7%)		
<b>Gender</b>				
Female	91 (40.3%)	135 (59.7%)	0.59	0.44
Male	44 (36.1%)	78 (63.9%)		
<b>Previous GPA</b>				
4 – 5	88 (42.3%)	120 (57.7%)	2.69	0.26
3 – < 4	40 (33.6%)	79 (66.4%)		
< 3	7 (33.3%)	14 (66.7%)		

**Table 6.** Factors affecting students' perception of the performance of teaching assistants as PBL facilitators ( $n=348$ )

Variables	Teaching Assistants Performance		Chi <sup>2</sup>	p-value
	Sufficient to High	Low or Insufficient		
<b>School Year</b>				
Year 3	56 (61.5%)	35 (38.4%)	2.53	0.47
Year 4	39 (60%)	26 (40%)		
Year 5	61 (62.2%)	37 (37.8%)		
Year 6	49 (52.1%)	45 (47.9%)		
<b>Gender</b>				
Female	135 (59.7%)	91 (40.3%)	0.182	0.67
Male	70 (57.4%)	52 (42.6%)		
<b>Previous GPA</b>				
4 – 5	131 (63%)	77 (37%)	3.73	0.16
3 – < 4	62 (52.1%)	57 (47.9%)		
< 3	12 (57.1%)	9 (42.9%)		

members and teaching assistants among students' gender, school year, and their previous GPA.

## 4. Discussion

Problem based learning (PBL) is a strategy of learning that is widely used in health professions education globally and is now one of the main learning strategies in Saudi medical schools<sup>15</sup>. Undergraduate Saudi medical students were found to be satisfied with the PBL strategy. Among the sources of this satisfaction was the facilitation skills of the class tutors<sup>16,17</sup>. The PBL tutor is one of the angles of

success in a PBL curriculum, in addition to the student and the educational problem. So, the skilled tutor plays an essential role in the success of the PBL sessions<sup>18,19</sup>.

In this study, we assessed the performance of faculty members and teaching assistants as class tutors based on the perception of the medical students. Data was collected through a questionnaire crafted by the researchers. Reliability study revealed high consistency of the questionnaire (Cronbach's alpha is 0.928) and validation through exploratory factor analysis (EFA) gave item loadings under three factors (components) and no

items were discarded from the analysis. So, our tool was proved to be valid and reliable.

The results of this study revealed that the TAs were perceived more positively than faculty members as PBL class tutors. This finding is congruent with a study conducted at a medical college in Pakistan and compared the teaching assistants versus faculty member's facilitation skills in PBL tutorial sessions<sup>20</sup>. In another study, Steele *et al.*<sup>21</sup> stated that the better achievement of the learning outcomes for the students taught by student-led PBL tutorials that other students who were taught by faculty-led PBL tutorials. However, the difference was not statistically significant.

TAs appear to show better facilitation skills in PBL tutorials, especially in guiding student groups through interactive two-way discussion, identifying the students' misconceptions, and giving constructive feedback on their performance during tutorial sessions. This can be explained by the fact that TAs are closer to the students in age and thinking and the students are more likely to be open with them than with faculty members. As such, TAs were described as 'student-directed tutors' who, according to Wilkerson *et al.*, 1991, guide the work of the group and facilitate self-directed learning, which are the hallmarks of effective PBL<sup>22</sup>. Moreover, Neville, 1999 argued that faculty may be so wary of falling into their natural directive role that they adopt a completely "hands-off" approach, failing to guide students when necessary<sup>23</sup>. Furthermore, Groves *et al.*<sup>24</sup> found subject expertise affects tutor's facilitation skills as they tend to use their subject-matter knowledge considerably compared to non-subject expert. In the context, Nagraj *et al.*<sup>25</sup> reported that the students' evaluation for the performance of the tutor was more positive for near-peer PBL tutors compared to staff tutors<sup>25</sup>.

Regarding the expertise and qualifications of faculty tutors, Silver and Wilkerson<sup>26</sup> and Chung *et al.*<sup>27</sup> argued that expertise detracts from a tutor's role as a facilitator and tutors' qualifications are not significantly associated with students' perception of their performance. On the other hand, Maudsley<sup>28</sup> argued that faculty members who have also training in PBL facilitation are more likely to be better PBL tutors.

Regarding the factors that might affect students' perception of tutor facilitation skills, the current study did not find any significant differences based

on students' gender, school year, and previous GPA. This is contradicting with the results of Aldayel *et al.*<sup>29</sup>, who reported that students' perception of tutors' facilitation skills was affected by their previous GPA.

## 5. Conclusion

Perception of the medical students of the PBL facilitation skills of teaching assistants was more positive than their perception of those skills of faculty members. Teaching assistants are suitable PBL facilitators probably because they have better understanding of students' needs than faculty members, being closer to them in age or their recent experience as undergraduate medical students. Further, in-depth studies are recommended to address the factors affecting the facilitation skills PBL tutors and the reasons behind students' preference of teaching assistants more than faculty members in facilitating PBL tutorials.

Further studies are recommended on a larger sample size, and the investigated factors that may affect the level of performance should be associated with the tutors, not the students, to determine the factors that made teaching assistance of higher performance than faculty members.

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