

## Perceptions of medical undergraduates towards Problem Based Learning (PBL) in an integrated outcome based curriculum at College of Medicine, Majmaah University, Saudi Arabia

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### Abstract

**Introduction:** An integrated outcome based curriculum is structured on the basis of predefined measurable exit outcomes that students need to achieve at the end of the course. Problem Based Learning (PBL) was developed at McMaster University (1968) as one of the student centred teaching modalities promoting self-directed learning. The college of medicine, Majmaah University, was started in 2010 with an integrated, outcome based hybrid curriculum.

**Objectives:** To assess the perception of the students and compare their feedback from different years towards PBL as one of the teaching and learning methods in the modules of phase II of the curriculum.

**Methods:** It was a cross-sectional study. It consisted of all medical undergraduates (Year 1, 2 & 3) studying at college of medicine, Majmaah University. A self-administered questionnaire based on VARK learning styles and learning theories on a five point Likert rating scale was used.

**Results:** PBL is a reliable tool for facilitating visual/spatial learning, majority of the students agreed to it 62 (54.2%). 75% of students strongly agreed that PBL is a reliable tool for facilitating auditory learning. 99 (88.1%), students, responded that PBL facilitates in developing interpersonal skills. 82 (72.4%) students perceived that PBL helped in developing the skills of problem solving, decision taking and practical application of ideas. No significant association was observed between year-wise analysis and perception of students for various PBL questions ( $p > 0.05$ ).

**Conclusion:** PBL is a teaching and learning tool that engaged diverse learning styles and facilitate in developing vital skills that are necessary for future doctor.

### Introduction

From the year 1990, the medical curricula have shifted from traditional subject based approaches towards more integrated, system based curricula (Ling *et al.*, 2008).

The introduction of outcome based education simultaneously led to the realization for the significance of active learning.

One such active teaching and learning method is Problem Based Learning (PBL) which was introduced by McMaster University, Canada in the 1960s. The College of Medicine, Majmaah University started in 2010 as one of the newly established colleges in Saudi Arabia. It is implementing an outcome based integrated hybrid curriculum. Problem Based Learning is one of the foremost teaching and learning methods implemented in Phase II of the curriculum. The phase II is of two and half year's duration consist of system based modules mainly comprised of basic medical science subjects along with pathology,

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microbiology, biochemistry with thirty percent blend of clinical subjects. Therefore, this study was planned to identify the student's perception regarding PBL as teaching and learning method.

## Methods

This cross sectional study was done at College of Medicine, Majmaah University, Saudi Arabia from November, 2013 to April, 2014 and it comprised of 1st, 2nd and 3rd year medical students. The total number of the students enrolled in year 1, 2 and 3 were 133. All were included in this study by using complete enumeration sampling technique. Ethical approval was obtained from Majmaah Institution Ethics Review Committee.

A self-administered questionnaire based on the VARK learning styles and learning theories on five point Likert rating scale was used. The questionnaires were completed in three months from January 2014 to March 2014. The first four items in the questionnaire focused on the perception of students regarding facilitating visual, auditory, kinesthetic learning and reading and writing skills by PBL.

The other items in the questionnaire were about the perceptions of the students regarding achieving of vertical integration, horizontal integration, providing peer feedback and stimulation of deep learning by PBL as teaching and learning methods. There were total twelve questions in the questionnaire. The reliability of the questionnaire was determined by Cronbach's Alpha with split-half method. The data was entered and analysed using SPSS 22.0. Mean+SD was reported for quantitative variables. Frequencies and percentages were reported for qualitative variables. Pearson Chi-square and Fisher Exact tests were applied to observe associations between qualitative variables. A p-value of <0.05 was considered as statistically significant.

## Results

Majority of the students belonged to studying year 1 (n=48, 42.9%), almost one quarter students were studying in year 2 and (n=24, 21.4%) were studying in year 3. For item number one (facilitating visual/spatial learning) and item number three (facilitating kinesthetic learning), the study showed positive perceptions of students towards PBL as teaching and learning method in their

curriculum. For item two (auditory learning) and item four (reading and writing skills), the students perceive PBL as an effective learning tool. For self-development and developing interpersonal skills (item 5 and item 6), the students perceive PBL as an effective tool as an instructional approach in their curriculum. On learning behavior (item number 7, 11 and 12), and curriculum strategies (item number 8, 9 and 10), the perceptions of students are toward positive side (Table 1).

## Discussion

Broadly this study included facilitating learning mode (like visual, auditory, read/write and kinesthetic); self-development (self-confidence and interpersonal skills); learning behaviour (deep learning, multiple feedback and attitude towards leaning) and finally the curriculum strategies (curriculum outcomes and integration). As discussed in results, students perceive PBL as a reliable tool for facilitating auditory learning. For developing reading and writing skills, their perceptions towards PBL are on positive side. On facilitating kinesthetic learning, the students perceive it as weak tool as shown in results.

For the facilitation of visual and spatial learning by PBL, the students perceive it as inappropriate tool. The visual learning can be promoted in PBL by inclusion of pictures, diagrams etc. in the case scenario or the using concept maps for achieving learning objectives. Hsu (2004) used concept maps in discussion part of PBL and has reported it to be quite beneficial. Similarly, kinesthetic learning can be facilitated by using role play, any demonstration, bringing models of basic medical science subjects etc. in the given problem or learning objective.

Students perceive that PBL have positive impact on self-development like self-confidence and interpersonal skills. It also showed positive effect on learning behaviour like deep learning, advantage of multiple feedback and positive modification of attitude towards leaning. Wood *et al.*, (2014) referred that developing deeper understanding is cornerstone of Problem based learning.

Similarly, students in this study perceived it as a learning tool that stimulates deep learning. This study positively correlates achieving of learning outcomes by using PBL as a learning tool. Studies showed that learning environment and methods plays important role for achieving high quality learning outcomes

by any teaching and learning method (Kember & Leung, 2006). In this study, the students perceived PBL as facilitating horizontal integration. Hasan (2013) stressed that using well designed PBL in a system based modules

would facilitate horizontal integration. The perceptions of the students in this study positively correlates that PBL facilitates vertical integration.

**Table 1: Year wise associations with perception & attitude of students**

Items	Years			Items	Years		
	1 n(%) N = 48	2 n(%) N = 40	3 n(%) N = 24		1 n(%) N = 48	2 n(%) N = 40	3 n(%) N = 24
<b>1. PBL is a reliable tool for facilitating visual/spatial learning.</b>				<b>7. PBL stimulates deep learning.</b>			
Strongly Disagree	11 (22.9)	06 (15.0)	09 (37.5)	Strongly Disagree	01 (2.10)	00 (0.00)	00 (0.00)
Disagree	17 (35.4)	16 (40.0)	05 (20.8)	Disagree	05 (12.4)	01 (2.50)	00 (0.00)
Neutral	06 (12.5)	15 (37.5)	06 (25.0)	Neutral	12 (25.0)	03 (7.50)	02 (8.30)
Agree	13 (27.1)	00 (0.00)	04 (16.7)	Agree	14 (29.2)	14 (35.0)	12 (50.0)
Strongly Agree	01 (2.10)	03 (7.50)	00 (0.00)	Strongly Agree	16 (33.3)	22 (55.0)	10 (41.7)
p-value =0.514				p-value =0.054			
<b>2. PBL is a reliable tool for facilitating auditory learning</b>				<b>8. PBL helped in achieving curriculum outcomes.</b>			
Strongly Disagree	00 (0.00)	00 (0.00)	01 (4.20)	Strongly Disagree	00 (0.00)	01 (2.50)	00 (0.00)
Disagree	01 (2.10)	00 (0.00)	00 (0.00)	Disagree	06 (12.5)	01 (2.50)	00 (0.00)
Neutral	10 (20.8)	09 (22.5)	02 (8.30)	Neutral	14 (29.2)	10 (25.0)	07 (29.2)
Agree	26 (54.2)	17 (42.5)	17 (70.8)	Agree	16 (33.3)	18 (45.0)	10 (41.7)
Strongly Agree	11 (22.9)	14 (35.0)	04 (16.7)	Strongly Agree	12 (25.0)	10 (25.0)	07(29.2)
p-value =0.166				p-value =0.495			
<b>3. PBL is a reliable tool for facilitating kinesthetic learning (learning by doing).</b>				<b>9. PBL fulfills vertical integration.</b>			
Strongly Disagree	14 (29.2)	12 (30.0)	09 (37.5)	Strongly Disagree	00 (0.00)	00 (0.00)	00 (0.00)
Disagree	14 (29.2)	10 (25.0)	05 (20.8)	Disagree	02 (4.20)	01 (2.50)	00 (0.00)
Neutral	04 (8.30)	03 (7.50)	02 (8.30)	Neutral	22 (45.8)	13 (32.5)	06 (25.0)
Agree	13 (27.1)	07 (17.5)	04 (17.7)	Agree	15 (31.3)	19 (47.5)	09 (37.5)
Strongly Agree	03 (6.30)	08 (20.0)	04 (16.7)	Strongly Agree	09 (18.8)	07 (17.5)	09 (37.5)
p-value =0.773				p-value =0.259			
<b>4. PBL is a reliable tool for developing reading and writing skills.</b>				<b>10. PBL fulfills horizontal integration.</b>			
Strongly Disagree	01 (2.10)	01 (2.50)	00 (0.00)	Strongly Disagree	00 (0.00)	00 (0.00)	00 (0.00)
Disagree	05 (10.4)	00 (0.00)	00 (0.00)	Disagree	01 (2.10)	01 (2.50)	00 (0.00)
Neutral	05 (10.4)	06 (15.0)	04 (16.7)	Neutral	15 (31.3)	08 (20.0)	03 (12.5)
Agree	21 (43.8)	17 (42.5)	14 (58.3)	Agree	18 (37.5)	18 (45.0)	12 (50.0)
Strongly Agree	16 (33.3)	16 (40.0)	06 (25.0)	Strongly Agree	14 (29.2)	13 (32.5)	09 (37.5)
p-value =0.342				p-value =0.634			

<b>5. PBL helped in developing verbal/linguistic skills and self-confidence.</b>				<b>11. PBL provided the opportunity of peer teaching and peer feedback.</b>			
Strongly Disagree	00 (0.00)	00 (0.00)	00 (0.00)	Strongly Disagree	00 (0.00)	00 (0.00)	00 (0.00)
Disagree	00 (0.00)	00 (0.00)	00 (0.00)	Disagree	02 (4.20)	00 (0.00)	00 (0.00)
Neutral	06 (12.5)	02 (5.00)	01 (4.20)	Neutral	09 (18.8)	02 (5.0)	04 (16.7)
Agree	14 (29.2)	16 (40.0)	10 (41.7)	Agree	21 (43.8)	22 (55.0)	11 (45.8)
Strongly Agree	28 (58.3)	22 (55.0)	03 (54.2)	Strongly Agree	16 (33.3)	16 (40.0)	09 (37.5)
p-value =0.604				p-value =0.355			
<b>6. PBL facilitates in developing interpersonal skills.</b>				<b>12. Receiving of the feedback, during the PBL sessions modifies your attitude towards learning.</b>			
Strongly Disagree	00 (0.00)	00 (0.00)	00 (0.00)	Strongly Disagree	00 (0.00)	00 (0.00)	00 (0.00)
Disagree	00 (0.00)	00 (0.00)	00 (0.00)	Disagree	05 (10.4)	00 (0.00)	00 (0.00)
Neutral	08 (16.7)	02 (5.00)	03 (12.5)	Neutral	18 (37.5)	11 (27.5)	09 (37.5)
Agree	17 (35.4)	12 (30.0)	09 (37.5)	Agree	13 (27.1)	19 (47.5)	09 (37.5)
Strongly Agree	23 (47.9)	26 (65.0)	12 (50.0)	Strongly Agree	12 (25.0)	10 (25.0)	06 (25.0)
p-value =0.378				p-value =0.187			

### Limitations

First, this study has small number of the sample because only three batches were available during the study period. Second, only male students were included in our study as female college had not started at that time

### Conclusion

The result of the study shows that PBL has positive impact in all of the aspects except for visual and kinesthetic learning domains. The visual learners can be facilitated by including diagrams and charts in the problem scenario and concept maps, flow charts for discussion session. Similarly, the kinesthetic learning can be facilitated by bringing models and specimens for anatomy, physiology and pathology. Students perceived that PBL helped in increasing their self-confidence and interpersonal skills; these two are important ingredients for a good clinician. Positive perception about PBL for learning behaviour helps us to assume that these PBL sessions will help the student to become lifelong learner which is essential for a doctor.

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