

## Comparison of Traditional lectures vs. Problem based learning in Microbiology among Undergraduate students

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### Abstract

Problem-based learning (PBL) is a methodology in which students are the teachers themselves and the faculty mainly acts like their facilitators it is to say that this is student-centered approach to active learning.

**Objectives:** To study the efficacy of problem based learning as a teaching/ learning tool over traditional lectures in Microbiology.

**Materials and Method:** Experimental study was conducted in department of microbiology after obtaining ethical committee permission and students consent. 60 students of MBBS 3rd semester were divided in to two batches A & B with 30 each. Internal class test marks of the two batches were taken to acknowledge the validity of post test result, followed by sessions on PBL for batch A and traditional lecture for batch B, at the end, sessions were evaluated by post test in the form of MCQ, short assay and by taking feedback on PBL from both the batches by exposing batch B to PBL. SPSS was used for data entry and analysis.

**Results:** The evaluation of internal class test marks of the two batches showed statistically insignificant (p value 0.261), after the sessions of PBL and traditional learning on a selected topic the post test conducted showed result was significant (p value <0.01) in favor of PBL. The feedback received favored PBL.

**Conclusion:** Based on the findings in my study where PBL was evaluated in comparison to the traditional learning it was found that PBL was a better learning tool when compared to traditional method.

**Keywords:** PBL, Traditional learning

### Introduction

Medical education throughout the world is rapidly evolving and newer methods are being experimented to bring out better medical graduates who can cope up with the changes that are taking place in the medical field, keeping this in mind a novel approach of problem based learning for the Indian under graduates was taken up in the department of microbiology and compared with traditional lectures with the main aim to find out which methodology will be better for our students. Problem-based learning (PBL) is a methodology in which students are the teachers themselves and the faculty mainly acts like their facilitators it is to say that this is student-centered approach to active learning in which it helps students to construct an extensive and flexible knowledge base, develop effective problem-solving skills, develop self-directed, lifelong learning skills, to become effective collaborators.<sup>(1,2,3,4,5,6,7)</sup>

### Materials and Method

The study was conducted in department of Microbiology from Oct 2014 to March 2015. A total 60 students of MBBS 3rd semester (2013-2014 batch) were divided in to two batches A & B with 30 each after their consent and Internal class test marks of the two batches were taken to acknowledge the validity of posttest result. PBL session for batch A was conducted by subdividing batch in to 5 groups of 6 students each, in each group a

chairman was chosen to lead the discussion in that group with two classes 3 days apart, in the first class the students were given the problem, learning issues identified, resources were suggested, followed by a self-directed learning period. In the second class the learning was consolidated and product prepared. Traditional lecture session for batch B on the same topic was conducted.<sup>(1,2,4,5,6,7)</sup> The sessions were evaluated by conducting test in the form of MCQ, short essay and also by taking feedback on PBL from both the batches by exposing batch B also to PBL methodology. SPSS was used for data entry and analysis

Type of study: Experimental

Date of IRB Approval: IEC/MES/69/10.11.2014

### Results

The evaluation of internal class test marks of the two batches A & B showed statistically insignificant (p value 0.261) as shown in Table 1, this showed that both the batches were equally placed, with almost the same learning abilities, after the session of PBL for batch A and traditional learning for batch B on a selected topic the post test conducted showed result as significant (p value <0.01) as shown in Table 2 in favor of PBL. In the feedback received as shown in Fig. 1 based on likert scale, 29.2% strongly agreed 44.8% agreed that PBL is more effective when compared to traditional learning in microbiology.

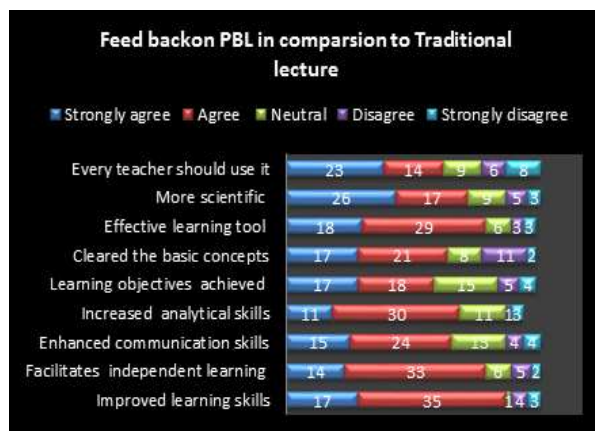
**Table 1: Comparison of Internal exam scores**

Batch	N	Mean score	Std. Deviation	Std. Error Mean	*t value	p value
A	30	12.283	3.2766	0.5982	1.135	0.261
B	30	13.133	2.4668	0.4504		

**Table 2: Comparison of Post test score**

Lecture	N	Mean score	Std. Deviation	Std. Error Mean	*t value	p value
Traditional lecture Batch B	30	3.367	1.1366	0.2075	-6.122	<0.01
PBL Batch A	30	6	2.0636	0.3768		

\*unpaired t test



**Fig. 1**

**Discussion**

Medical education is a very wide area of study where so many departments collaborate together to teach the undergraduates in order to produce good doctors to the society and this education is not immune to the changes in information technology that is rapidly evolving and slowly playing an important role, so also the methods of teaching have evolved and the mindset of learner is also changing, previously it was guru on whom the students were totally dependent for knowledge but nowadays just a click of button will give an abundant information. So giving knowledge is not the sole responsibility of the medical teachers now they need to evolve themselves in to facilitators so that they can correctly facilitate the students to get the correct knowledge and develop self-learning ability in the right direction. The study taken up was an experimental study, as problem based learning is not there in our curriculum for teaching microbiology so we wanted to know how effective PBL can be as a tool in teaching and learning microbiology.

Before starting the sessions of PBL and traditional learning we felt it better to take the internal class test average marks of the students in the two batches A & B which was recently conducted so that the students in the two batches had almost the same learning abilities to avoid any bias in the post test results. After tabulation and calculating the average marks scored by the student

and comparing it with unpaired t test for statistical significance it was found to be statistically insignificant (p value 0.261) as shown in Table 1, this showed that in our study the two batches were equally placed, with almost the same learning abilities.

After the sessions of PBL and traditional learning on a selected topic the post test conducted showed result was significant (p value <0.01) as shown in Table 2 in favor of PBL. In my study it was found that PBL is helping the students to perform better when taught with PBL as PBL improves their conscious thinking and allow them to probe and learn on their own as real life experience learnt by own effort is remembered for a longer time in life when compared to what is given in traditional lecture as readymade form without any effort from the students as also reported by Abhraham et al<sup>(3)</sup> in his studies where he showed that there was 9% difference in the graduation rate when the students were taught with PBL when compared to other methods of learning, Hmelo-silver CE<sup>(6)</sup> also showed that PBL is a better way of learning where he quoted a number of studies showing that PBL is a better mode of learning, also proved by MAA Majumder in studies and review of various works of PBL in the Indian subcontinent<sup>(8)</sup> but Almasoudi B<sup>(4)</sup> showed that PBL when compared to the traditional learning in terms of outcome was within the margin of error where in his study posttest analysis showed a slight improvement with PBL 1.34 when compared to traditional method 1.17.

In the feedback received as shown in figure 1 based on likert scale, 29.2% strongly agreed 44.8% agreed that PBL is more effective when compared to traditional learning in microbiology so in my study students in their feedback agreed that PBL has definitely helped them in understanding the subject and also they were able to correlate to the real life situations. Shankar PR et al<sup>(9)</sup> also showed in his study the Student feedback supports problem-based learning as a valid teaching-learning methodology which will enhance the student understanding of even difficult concepts in medical school setting.

## Conclusion

Based on the findings in my study where PBL was evaluated in comparison to the traditional learning it was found that PBL was a better teaching and learning tool in microbiology as also proved by various studies conducted in India and other nearby south east Asian countries as shown by MAA Majumder<sup>(8)</sup> Abraham et al<sup>(3)</sup> Hmelo-silver CE<sup>(6)</sup> Shankar PR et al.<sup>(9)</sup> On the whole we recommend that PBL cannot totally replace the traditional learning but it can be introduced for learning microbiology for undergraduates.

## Limitations

- Small sample size
- Non randomized study

## References

1. Telang A. Problem-based learning in health professions education *archeives of medicine and health sciences* : An overview. 2014;2(2).
2. Wadani F, Khan AR. Problem-based learning in ophthalmology. *Oman J Ophthalmol* A brief review 2014;7:1-2.
3. Abraham RR, Ramnarayan K, George BM, Adiga I, Kumari GR, Suvarna N, et al. Effects of problem-based learning along with other active learning strategies on short-term learning outcomes of students in an Indian medical school. *International Journal of Health & Allied Sciences* • 2012;1(2).
4. Almasoudi B. Problem-Based Learning as a Teaching Method Versus Lecture-Based Teaching in Respiratory Therapy Education. 2012;46. Available from: [http://scholarworks.gsu.edu/rt\\_theses/13](http://scholarworks.gsu.edu/rt_theses/13).
5. Graaff EDE, Kolmos A. Characteristics of Problem-Based Learning. *Int J Engng Ed*. 2003;19(5):657–62.
6. Hmelo-silver CE. Problem-Based Learning: What and How Do Students Learn? *Educational Psychology Review*, 2004;16(3):235–67.
7. Hung, Woei Jonassen, David H Liu, Rude Handbook of research on educational communications and technology 2008 (485-506)
8. MAA Majumder. Pros and cons of problem-based learning. *Bangladesh Medical Journal* 2004, 33, 67-69.
9. Shankar PR, Nandy A. Student feedback on problem-based learning processes What this study adds: *Australian medical journal* 2014;7(12):522–9.