

## **Problem Based Learning In Comparison To Traditional Teaching As Perceived By the MBBS Students of a North Indian Teaching Hospital**

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### **Abstract:**

**Objectives:** To compare lecture based learning (LBL) with problem based learning (PBL).

**Methods:** A cross sectional prospective study was carried out among 145 3<sup>rd</sup> year MBBS students in Jawaharlal Nehru Medical College(JNMC), Aligarh. The study was performed for a period of 60 days. Data was collected by means of structured questionnaire.

**Results:** 65 (44.8%) students were girls while 80 (55.2%) were boys. 89 (61.4%) students liked only PBL followed by both LBL and PBL by 104(71.7%) students. 59(40.7 %) students claimed that PBL has led to better understanding of subject while 71(48.9%) respondents favored both LBL and PBL. 98(67.6%) respondents admitted that PBL has led to more clarification of their concepts while 105(72.4%) students appreciated both. Coverage of sufficient syllabus through PBL and both was claimed by 91(62.8%) and 105(72.4%) students respectively. Majority 94(64.8%) was satisfied with training of the teacher for traditional teaching while 106(73.1%) were satisfied with training of facilitator for PBL. 69(47.5%) students were satisfied with availability of resources for PBL while 71(48.9%) were for both methods combined together. 91(62.8%) respondents preferred present scenario (LBL parallel with PBL) in JNMC.

**Conclusion:** LBL must be in symbiosis with PBL for better analytical approach and clarification of concepts. There is need to improve the information resources for PBL and enhancement of practical knowledge of students.

**Keywords:** concepts, facilitator, lecture, problem based learning, syllabus.

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### **I. Introduction**

Problem-based learning (PBL) is a student-centered pedagogy in which students learn about a subject through the experience of problem solving. PBL was pioneered in the medical school program at McMaster University in Hamilton, Ontario, Canada in the late 1960s by Howard Barrows and his colleagues for undergraduate medical students.[1] Traditional medical education disenchanted students, who perceived the vast amount of material presented in the first three years of medical school as having little relevance to the practice of medicine and clinically based medicine.[2]

The PBL curriculum was developed in order to stimulate the learners, assist the learners in seeing the relevance of learning to future roles, maintain a higher level of motivation towards learning, and to show the learners the importance of responsible, professional attitudes.[2] Later the system was adopted by Europe, USA and rest of the world.[3]

A study carried out among 1st year students at Nelson Mandela school of Medicine showed that majority of the students benefited from input of other students in PBL tutorials as they were conducted in small groups.[4] Another study showed that knowledge and power of interpretation was quite improved among students on reaching the 3rd year but their interest in the process of PBL conduction was lost and they developed short cuts to solve the problem.[5] Sweller et al proposed the concept of cognitive load which stated that active problem solving early in the learning process is a less effective instructional strategy than studying worked examples.[6]

However evaluation of the effects of PBL learning in comparison to traditional instructional learning has proved to be a challenge. Various factors can influence the implementation of PBL: extent of PBL incorporation into curriculum, group dynamics, nature of problems used, facilitator influence on group, and the motivation of the learners. Additional studies are needed to investigate all the variables<sup>1</sup> and technological scaffolds [7] that may impact the efficacy of PBL.

It has been reported that instead of didactic communication in lecture hall, active participation of students in PBL had a bigger role to play in continuing medical education.[3]

The current study was aimed to compare the perception of 3rd year MBBS students regarding the two teaching methodologies of LBL and PBL in Jawaharlal Nehru Medical College, Aligarh.

## **II. Materials And Methods**

A cross sectional comparative study was conducted among 145 MBBS 3<sup>rd</sup> year students of Jawaharlal Nehru Medical College (JNMC), Aligarh. As only current 3<sup>rd</sup> year MBBS students of JNMC were taught both by lectures and PBL sessions, only these were enrolled in the study by convenience sampling. Duration of the study was 60 days (20<sup>th</sup> November-20<sup>th</sup> January, 2015). In this study, LBL was a teaching methodology characterized by delivery of lectures i.e., knowledge was imparted by teachers whereas in PBL, problem based scenarios were given to the students divided in small groups instead of delivering lectures and students were supposed to solve those problems themselves by means of books, internet and journals. Data was collected by means of structured questionnaire (Annexure). Moreover, we asked the students about their contentment with resources available for PBL sessions and their satisfaction with present scenario where PBL is running parallel to lectures.

### **1.1 Validity assessment**

Three experts (2 professors and one associate professor) determined the validity of each question as well as the entire questionnaire. Two indices (relevancy and clarity) were assessed for each question, and four indices (relevancy, clarity, inter-rater agreement, and comprehensiveness) were calculated for the entire questionnaire. For each question and the entire questionnaire, the experts scored each of the above mentioned indices from 1 to 4, with 1, 2, 3, and 4 corresponding to poor, fair, good, and excellent, respectively. Once scoring was complete, the following indices were calculated: 1) item content validity index, which shows validity for each question; 2) scale validity index, which shows validity for the entire questionnaire; 3) inter-rater agreement, which shows how well experts agree on the validity of the questionnaire; and 4) comprehensiveness score, which shows what percentage of experts agree that the questionnaire is comprehensive. To calculate the item validity index, the scores were dichotomized into two groups: good or excellent vs. fair or poor. The item validity index for each question (for both clarity and relevancy) was calculated as the percentage of experts who rated the question as good or excellent. For each index, a cutoff point of 0.80 was considered as acceptable validity. For questions with validity indices less than 0.80, the question was revised or excluded. The scale validity index was calculated using the average item level method,<sup>8</sup> in which the average of clarity or relevancy score from all questions is calculated. The inter-rater agreement was calculated as the percentage of questions considered excellent or good by all experts. The scale comprehensiveness score was defined as the percentage of experts who considered the comprehensiveness of the questionnaire as good or excellent, rather than poor or fair. Therefore, it was calculated as the number of experts who rated the questionnaire as good or excellent divided by the number of all experts.

### **1.2 Reliability assessment:**

The test-retest method was used to evaluate reliability. We administered the questionnaire to 133 case subjects and 50 control subjects twice, with a 2 or 3-week interval between the administrations. Inter-Class correlation coefficients (ICC) and kappa statistics were used to determine reliability. For each of these statistics, a cutoff point of 0.70 was considered as denoting acceptable reliability. After calculating the index, in consultation with experts, questions with reliability values of less than 0.70 were revised or excluded.

### **1.3 Statistical analysis:**

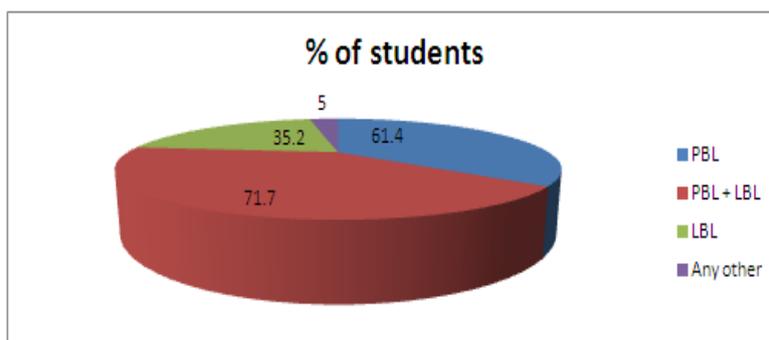
Statistical analyses were conducted using SPSS, version 19. The indices calculated included item validity index for clarity, item validity index for relevancy, scale validity index for clarity, scale validity index for relevancy, inter-rater agreement, scale comprehensiveness scale, ICC for quantitative variables, and kappa statistics for categorical variables, as noted above.

## **III. Results**

Of the total 145 students, 49 respondents were day scholars while 96 students were hostelites. Male to female ratio was 80:65 (1.23). Eighty nine (61.4%) respondents liked only PBL, 104 (71.7%) liked both LBL and PBL and 51 (35.2%) appreciated only LBL as shown in Fig 1.

**Table 1. Attribute of various teaching methods:**

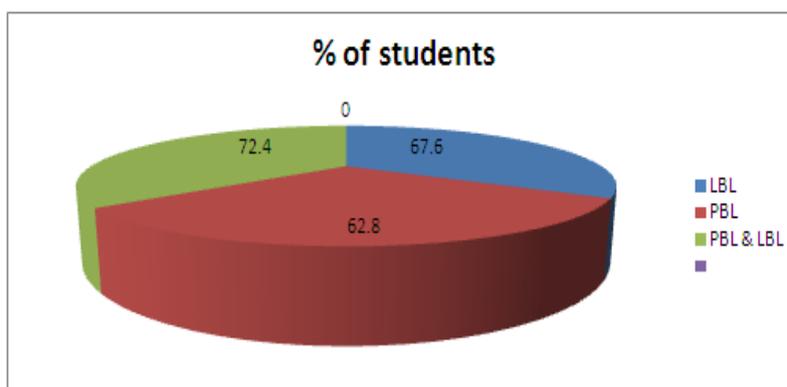
Better analytical approach imparted by		various teaching methods methodologies		
PBL	PBL & LBL	LBL	Any	other
86(59.3%)	102 (70.3%)	37 (25.5%)	22(15.2%)	
More clarification of concepts in medical st studies imparted by various teaching Method solog				
PBL	PBL & LBL	LBL	Any	other
98 (67.6%)	105(72.4%)	26 (17.6%)	21(14.5%)	
Significance of subjects' integration in better		concepts of the students		
Yes	No	Don't know		
105(72.4%)	35 (24.1%)	5(3.4%)		



**Fig 1. Student appraisal of various teaching methods:**

Approach of the study participants pertaining to the attribute of different teaching methods in imparting better analytical approach, long term learning of subject, more conceptualization with different teaching and methodologies and benefit in integration of all subjects is reflected in Table 1.

Ninety eight (67.5%) respondents expressed that sufficient syllabus was covered by traditional teaching /lecture based learning, 91(62.8%) by PBL only whereas 105(72.4%) students reported adequate coverage of syllabus by both methods combined together as shown in Fig 2.



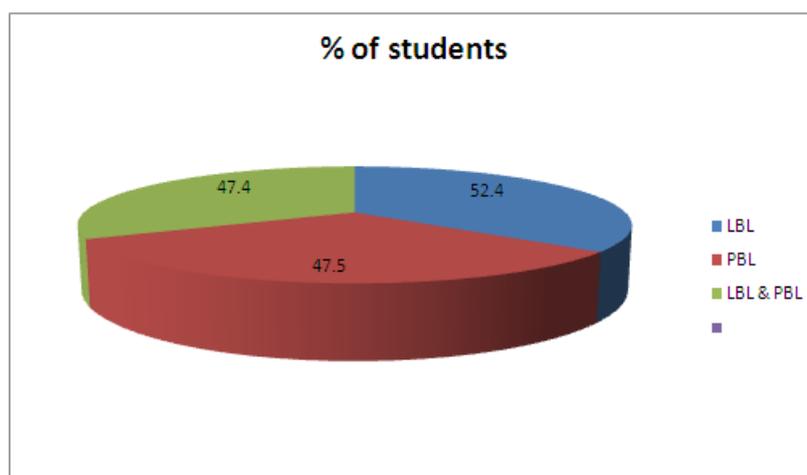
**Fig 2. Coverage of sufficient syllabus by PBL:**

Competency of both PBL facilitator as well as lecturer indulged in traditional teaching as perceived by the students of JNMC is shown in Table 2.

**Table 2. Training of facilitator/Lecturer for respective teaching methodologies:**

Training of facilitator for PBL sessions in JNMC		
Well trained	Not trained	Don't know
106(73.1%)	23(15.9%)	16(11%)
Training of lectures for traditional teaching /lectures in JNMC		
Well trained	Not trained	Don't know
94 (64.8%)	32(22.1%)	19(13.1%)

Sixty nine (47.5%) students were satisfied with the availability of resources for PBL, 76(52.4%) for LBL while 71(48.9%) students were satisfied for both methods combined together. Ninety one (62.8%) respondents were satisfied with present scenario in JNMC. Overall satisfaction of the respondents with availability of resources/facilities (library, internet, journals) for PBL sessions is reflected in Fig 3.



**Fig 3. Overall Satisfaction of students with availability of facilities for various teaching methods:**

The item content validity index for clarity was 0.80 or higher for 17 out of 18 questions. The corresponding index for relevancy was 0.80 or higher for 16 out of 18 questions.

#### **1.4 Content validity for the questionnaire:**

Using the average approach, the overall scale validity index for clarity and relevancy were 0.94 and 0.92, respectively. The inter-rater agreement for clarity and relevancy were 0.83 and 0.84 respectively. All the 3 experts rated the comprehensiveness of the questionnaire as good or excellent, thus yielding an overall comprehensiveness score of 100%.

#### **1.5 Reliability**

The ICC for quantitative items ranged from 0.73 to 1.0. The large majority of categorical items were above the predetermined acceptable level (0.70), with the only exception being question 15 where of training of lecturers / demonstrators for traditional teachings / PBL in delivering lectures was to be assessed by students (0.57). This question was retained as it was where low reliability was due to factors that were not relevant to the way the question was asked.

### **IV. Discussion**

In present study, majority of the students **89(61.4%)** liked PBL while only **51(35.2%)** liked LBL and **104 (71.7%)** respondents were in the favor of both PBL parallel with LBL. This might be due to great diversity in medical subjects/topics. Some of them are easily understood by self-learning while comprehension of some topics needs the help of tutor for better understanding. A study on teaching methods in Shifa College of Medicine showed that 67% of the students wanted LBL and PBL going on side by side.[9] A cross-sectional study showed that 79% of the medical students liked PBL sessions and it was observed that PBL helped them in building up communication skills, interpersonal relationship and problem solving capacity to great extent.[10]

Maximum students expressed that PBL leads to better understanding of subject and invokes self-learning habit among students. Probably this was due to the fact that PBL scenarios in JNMC are designed by the trained faculty members of the college who have full command on their respective subjects/topics. This methodology not only helps the students to understand the subject in depth but the process of PBL conductance also inculcates self-learning practice among students as they have to formulate their learning objectives themselves after receiving PBL scenarios, solve the problem themselves by means of internet, consulting various books etc. and actively participate in group discussions.

A similar study by Alam AY et al also concluded that PBL along with LBL will promote independent and creative learning among medical students.[9] In this study, 106 (73.1%) students claimed that facilitator was well trained for conducting PBL sessions. Facilitators committed for PBL sessions have to undergo various workshops to polish their skills for PBL facilitation. Moreover, facilitators in PBL are not supposed to

teach the students. Rather they have just to observe their performance and check them from deviation of their right track that is why students might not be able to judge the capability of their facilitators. An international study to assess the role of facilitators in PBL tutorials showed that facilitators must regularly review PBL tutorial processes and group dynamics with in tutorial settings.[11] In current study, only 69(47.5%) were satisfied with availability of resources for PBL sessions. As JNMC has a well-established library that is equipped with all the latest editions of all the medical books, the reason might be the provision of limited computers with internet facility and various online journal institutional subscriptions in the college due to which students are facing difficulty in finding solutions to their PBL scenarios. In our study, 105(72.4%) students agreed with the significance of the subjects' integration in the clarification of concepts in medical studies. Likewise, another study revealed that integrated curriculum promoted better understanding of health sciences pertaining to common diseases and majority of the respondents (77.61%) expressed that PBL in modules assisted to great extent in interpreting the cases in their annual examinations.[12]

This study also examined the content validity and test-retest reliability of a questionnaire designed to compare problem based learning with traditional lecture based learning as perceived by the students of Jawaharlal Nehru Medical College, Aligarh. The findings suggest that the questionnaire is comprehensive, has content validity, and the results are replicable over a two or three-week period. Moreover, the findings indicate that the individual questions are clear and relevant, necessitating only minor changes to the questionnaire. Inter-Class correlation coefficients (ICC) and kappa statistics for categorical variables suggest acceptable test-retest reliability for the large majority of questionnaire items.

## V. Conclusion

Both of the teaching methods we studied are indispensable for better understanding and more clarification of concepts pertaining to health sciences. However as both have their own strengths and fallacies, together these methods complement each other. Implementing PBL in colleges is a demanding process that requires resources, a lot of planning and organization. There is need to improve the facilities for better performance of the students in PBL, especially the provision of computers, journals and internet facility in hostels as well as in college. Last but not the least regular training and assessment of teachers and facilitators is the need of the hour.

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## Annexure

Comparison of Teaching Methods (PBL versus Traditional teaching) as perceived by the students of Jawaharlal Nehru Medical College, Aligarh.

### Questionnaire

1. Name of the student (optional)
2. Gender  Male  Female
3. Category of the student  Day scholar  Hostelite
4. Have you attended any session of PBL?
5. Yes  No  Don't know
6. Which of the following teaching methods is liked by you?

- a. Lecture Based learning b. Problem Based Learning
- c. Both a & b d. Any other
7. Which of the following teaching methods in your opinion leads to the better understanding of subject?
  - a. Lecture Based learning b. Problem Based Learning
  - c. Both a & b d. Any other
7. Do you think that the habit of self learning is inculcated by:
  - a. Lecture Based learning b. Problem Based Learning
  - c. Both a & b d. Any other
8. Which of the following teaching methods in your opinion leads to better analytical approach towards problem?
  - a. Lecture Based learning b. Problem Based Learning
  - c. Both a & b d. Any other
9. Do you think that integration of all the subjects is beneficial for better concepts?  
 Yes  No  Don't know
10. Which of the following teaching methods in your opinion leads to more clarification of concepts in medical studies?
  - a. Lecture Based learning b. Problem Based Learning
  - c. Both a & b d. Any other
11. Are you satisfied with the availability of resources (library, internet, stationary, separate room etc.) by the college administration for conductance of PBL sessions?  
 Yes  No  Don't know
12. If No, what other facilities must be added for better performance of the students?
13. Do you think that sufficient syllabus as per university requirement is covered through PBL sessions?  
 Yes  No  Don't know
14. Do you think that facilitators are well trained to do PBL sessions?  
 Yes  No  Don't know
15. Do you think that lecturers / demonstrators are well trained in traditional teachings / PBL to deliver lectures?  
 Yes  No  Don't know
16. Are you satisfied with the present scenario where lectures are concurrent / parallel with PBL?  
 Yes  No  Don't know
17. If Yes, why?
18. If No, what would be your recommendation for improvement of the current scenario?