

## ORIGINAL ARTICLE

## HYBRID PROBLEM BASED TEACHING AS AN ATTEMPT TO IMPROVE LEARNING OUTCOMES

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**Background:** Discussions and debates over the merits and de-merits of a single, ideal system of teaching and learning have ranged over decades. Objective of this study was to analyse the effectiveness of hybrid problem based learning to improve learning in under graduate students.

**Methods:** Two sessions of first year MBBS undergraduate students were compared. Lecture based teaching and hybrid problem based teaching on the same topic were done. Both were evaluated at the end of the term by a pre-test and a full term exam. **Results:** The overall marks obtained by students of hybrid problem based learning session in pre-test exam were significantly higher when compared to the lecture based session. When the marks of pre-test were categorized below 50%, between 50–65%, 66–80% and above 80% and then compared, they were significant ( $p < 0.001$ ). Students of hybrid problem based learning session obtaining 66–80% marks were 35.9%, and 7% obtained marks above 80%, while in the other session 5.7% had 66–80% marks and none had >80%. End-of-term exams results showed students of lecture based session having mean marks better than the others. **Conclusion:** Problem based learning has an advantage over lecture based learning enabling better retention of basic concepts and its improved application in clinical settings.

**Keywords:** Hybrid problem based learning, conventional lecture based learning

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## INTRODUCTION

Discussion and debates over the merits and demerits of a single, ideal system of teaching and learning have ranged over decades. Shaping the minds and grooming the students to become better professionals is the main objective. Large group teaching, small group learning, 'conventional' lecture based teaching, problem based/case based learning, clinical 'bedside' techniques, hands on approach and perhaps many more are the tools of the same trade. Literature focuses on the need to adapt changes in the mode of teaching. Taking note of this challenge, innumerable medical schools have hailed the development of novel methods of teaching.<sup>1,2</sup> Implementation of one or more than one method of teaching does not mean that it is the only effective format that should be followed and what has been undertaken in the past should be abandoned. However, keeping in mind the students who have to be prepared for tomorrow, who are no longer passive learners, who are more interested when learning is curiosity, who think differently and will learn differently, teaching methods need to be different as well.<sup>3</sup> If these challenges are not met by any category of teachers, both the teachers and their students will be left behind.

Several medical institutes have implemented a format of hybrid problem based learning (PBL) to see if such a system works before switching over totally to pure PBL. Hybrid PBL is a system originating from Harvard Medical School's New Pathway Curriculum which 'incorporates a carefully planned range of teaching techniques'. The New Curriculum stresses the fact that 'the scope, frequency and format of lectures

and laboratory sessions could be effectively altered to dovetail with effective problem based discussions'.<sup>4</sup>

This study is an attempt to explore the possibility of such a change which could be made in order to keep at par with developing curricular strategies, and to analyse the effectiveness of Problem Based Learning (PBL) compared to lecture-based learning (LBL).

## SUBJECTS AND METHODS

This study was conducted from April to June 2012. The course work of our institution undertakes the teaching of Physiology based on the delivery of lectures of 60 minute duration, five times a week with tutoring of the same topics in tutorial discussions of 60 minute duration in batches of 25–35 students, twice a week. This study included the students of undergraduate 1<sup>st</sup> year MBBS class. The topic analysed was Physiology of the Cardiovascular System (CVS). One hundred students of the session 2010–11 were taught in the designated lecture time and tutored on the same footings in batches of 25 students. One tutor in these discussions recapped the knowledge delivered in lectures with the help of cross-questioning between tutor and student. The course spanned duration of 19 weeks.

In 2011–12, the same course was delivered to a group of 150 students, spanning duration of 12 weeks. LBL was, however, now endorsed by the same weekly routine of small group discussion based on PBL. One tutor supervised working of 5–7 groups in a total batch of 30–35 students. Each group consisted of a chair, a scribe and 4–5 group members. The chair was responsible to lead the group, encourage participation

and ensure time management. The scribe was responsible to record observations made by the group and to keep them in order. In addition, the resource material used by the group was also recorded by the scribe. Each group was given a clinical scenario to discuss making sure that the scenario incorporated the basic gist of physiology and its clinical implication. Both sessions were assessed halfway through their full course of CVS and at the conclusion of the topic by a format of examination based on multiple choice questions and short essay type questions.

Data was analysed using SPSS-22. The alpha value was kept at 0.05.

## RESULTS

The overall marks obtained by students of hybrid PBL session in pretest exam were significantly higher when compared to the LBL session (Table-1). When the marks of pretest were categorised <50%, 50–65%, 66–80% and >80% and compared between two sessions, there were significant differences ( $p < 0.001$ ). Here 35.9% students of hybrid PBL session had 66–80% marks and 7% had marks >80%, while in other session only 5.7% had 66–80% marks and none had >80%. However, end-of-term exams showed that students of LBL session had mean marks better than the other session.

**Table-1: Comparison of students' marks for the two sessions with different modes of study**

Exam	Marks Obtained (%)	Sessions				p
		PBL (2011-12)		LBL (2010-11)		
		n	%	n	%	
Pretest	≤50.0	41	28.9	32	36.8	<0.001
	51–65	40	28.2	50	57.5	
	66–80	51	35.9	5	5.7	
	≥81	10	7	0	0.0	
	<b>Total</b>	<b>142</b>	<b>100</b>	<b>87</b>	<b>100</b>	
Class Test	≤50	93	65.5	45	51.7	0.061
	51–65	41	28.9	31	35.6	
	66–80	8	5.6	11	12.6	
	<b>Total</b>	<b>142</b>	<b>100</b>	<b>87</b>	<b>100</b>	

## DISCUSSION

In keeping up with global changes in medical education which require students to be taught at a level where they should actively participate and learn in an equally active environment, medical colleges in Pakistan are playing a key role. In an attempt to achieve this goal, this study explores the outcome of two relevant methods of teaching, namely lecture based learning (LBL) and hybrid problem based learning (hybrid PBL). Numerous studies have shown that factual knowledge, recall and comprehension are some advantages of the active learning strategies invoked by problem based curriculum.<sup>5</sup> The same was the outcome in this study where students who were tested with an approach based on active learning, the outcome in terms of their result

were better. They retained the know-how of the topics discussed in the form of problems based on clinical scenarios. Their approach to solving clinical puzzles based on their awareness of basic sciences is better than those of their counterparts.

Such an outcome is supported by studies done elsewhere; a study conducted in a medical college in Iran<sup>6</sup>, gave the same result. So does one in Saudi Arabia, where Eiad *et al*<sup>7</sup> have suggested that PBL in any form, modified/hybrid or pure is by far at an advantage over the LBL process. The results of all of these studies indicate that the students have achieved better grades mid-way between the courses than at the end of them.

Moreover, in this study if the marks of the students were further categorised into percentages <50%, 50–65%, 66–80% and >80%, the number of students doing well in the higher percentage slot also got better in the hybrid PBL session. The reason why the students have failed to acquire a better result in the final term assessment in this study may be multi-factorial: a) the examination method itself was not assessed and quantified; b) the text assessed at the end-of-term examination was more than that used midway for evaluation; c) pressure of ongoing curriculum of other subjects diverts study time; and d) hybrid PBL used instead of pure PBL. A hybrid PBL strategy may not reap as fertile an outcome as is expected of pure PBL. PBL in itself is 'a comprehensive curricular strategy' as was pointed out by a very impressive debate<sup>8</sup>, though comparison of the merits and demerits of hybrid and pure PBL.

Another aspect of problem based learning, be it hybrid type or the pure form, is highlighted in this study. Recall and memorization are instilled by the conventional methodology of LBL as is evident by the fact that though the curriculum content was more, still results with the lecture based system were better in the end-of-term exams. This observation has been seen in studies where students from the PBL groups have 'self-reported' that they tend to 'cram less and memorize less' as compared to their peers subjected to lecture based teaching.<sup>8</sup>

## CONCLUSION

Hybrid form of teaching to undergraduate students which makes the concepts readily understandable and retainable seems to work. The activities incorporated in hybrid PBL invoke the learning abilities of the students and compel them to absorb the material efficiently and effectively.

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