

Problem-Based Learning vs. Traditional Lectures among Medical Students at Fatima Jinnah Medical University, Pakistan

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Objective: One of the most significant innovations in education during the last forty years is problem-based learning (PBL). In terms of the learning outcomes (such as knowledge, attitude, and skills) obtained from both approaches, the study's goal was to compare medical students' preferences for PBL versus regular lectures.

Methods: In 2023, Fatima Jinnah Medical University's medical students enrolled in the hybrid curriculum (PBL and traditional lectures) participated in a cross-sectional study. A self-administered, pre-constructed, validated, confidentially anonymous questionnaire was used to collect the data. The views of students of PBL and regular lectures were assessed through asking them to rate 20 statements on both forms of instruction on a five-point Likert scale. Software used for the analysis and descriptive statistics was SPSS, version 21 (SPSS Inc., Chicago, Ill., USA).

Results: PBL was preferred by learners over traditional lectures because it allowed them to better connect their understanding of basic and clinical sciences (t test=10.16, $P<.001$). Regarding the quantity of fundamental information recalled using both approaches, there was, however, no statistically significant difference ($P>.05$). PBL was chosen by students over lectures in terms of improved learning attitudes, skills, outcomes for the future, and learning satisfaction ($P<.05$). PBL encourages learning more than lectures do ($P<.05$). According to the students, there was a highly significant difference (t test=20.9, $P<.001$) between the mean total skill gained by PBL (47.20 [10.68]) and lectures (33.01 [9.97]).

Conclusions: Students preferred PBL more to traditional lectures for improving most of learning outcome domains, especially, learning attitudes and skills.

Keywords: Problem-based learning, Traditional Lectures, Medical Students

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Introduction

A decrease in the use of didactic lectures has coincided with the development of knowledge since education now places more emphasis on learning than on teaching. The widespread adoption of problem-based learning (PBL) is a result of this paradigm shift in education.(1) Project-Based Learning (PBL) is an expert teaching methodology founded on studies conducted on "how a learner most effectively learns. (2) Project-Based Learning (PBL) is a student-centered approach to education that encourages students to investigate, ask questions, make clarifications, analyze data, argue, debate, and manage it. This is accomplished by providing pupils with an appropriate scenario that piques their curiosity and gets them thinking, which enhances their learning potential. (6)- PBL's main goal is to push students academically and encourage them to use what they've learned about context in the workplace. (7.8)

PBL offers students with constructive learning, where they create their own meaning rather than being passive objects to be studied (9). Teachers have made the right decision in using PBL as a pedagogical approach, but if the goal

is to better prepare graduates for the workforce, then implementation must be based on constructivism. (10) PBL can also foster a variety of abilities, including lifelong learning, problem-solving, and clinical reasoning (1). According to a study, students in China's second-year undergraduate medical program were happier with hybrid-PBL curricula than they were with standard lectures.(11) Some medical institutions have changed to hybrid PBL curricula in response to growing concerns about traditional methods of medical education.(12) Fatima Jinnah Medical University launched a hybrid system-based curriculum. As required by the UK General Medical Council, it aims to comply with the guidelines for curriculum innovation provided in Tomorrow's Doctors.(13)

It might be useful to assess the strengths and limitations of both learning approaches by knowing how students view them.(14) Extensive research is needed to evaluate how PBL affects students' motivation, self-direction, and problem-solving and communication abilities. Ten To ensure that students are getting the most out of their learning, it is also necessary to put more effort into assessing the impact of various teaching strategies.(7) When comparing PBL to standard lectures, there are a lot of unresolved or just partially answered questions about the advantages.(15) The study's goal was to evaluate medical students' preferences between PBL versus standard lectures with respect to the learning outcomes (such as information, attitude, and skills) acquired through each approach.

Methods

A cross-sectional study was carried out at Fatima Jinnah Medical University, Lahore. It was conducted during the elective module of the fourth-year medical students during the year 2023. The target population was all medical students who studied the hybrid-PBL curriculum (third, fourth, and fifth year).

The team adhered to confidentiality and participation freedom as ethical guidelines while conducting fieldwork. Each participant's signed consent was obtained after they had each

been informed of the research's objectives in private and it had been agreed upon. Furthermore, all necessary administrative approvals were obtained.

A stratified random sampling approach with multiple stages was established. The educational year and gender were taken into consideration while stratifying. The following equation was used to estimate the sample (16): $n = \frac{Z^2 \cdot p \cdot q}{e^2}$ where n : the minimum sample size, Z =constant (1.96), p : is the "proportion or prevalence that meets our criteria."

As we do not know the previous proportion "p" from previous studies, so it was set at 0.5 (the most conservative estimate that leads to the largest "n"). $q=1-p=0.5$ The minimum calculated sample size to achieve a precision of $\pm 5\%$ with a 95% confidence interval was 384. For stratification purposes, the sample was exceeded to reach 460 during field work. A pre-structured, validated, anonymous, and confidential self-administered questionnaire was used to collect the data. Estimation of internal reliability was made through calculating Cronbach coefficient. The questionnaire collected:

- Personal and sociodemographic information: age, sex, etc.
- Students' perception toward PBL and traditional lectures: Students' perceptions were assessed through their response to 20 statements inquired about both methods of learning using a "five-point Likert scale," a scale of "1" indicating strong disagreement and of "5" indicating strong agreement.

These statements inquired about PBL and

Results

The study included 460 medical students in total. With a mean age of 21.1 (1.4) years, they varied in age from 18 to 23. 96.3% of the students were unmarried and 93.7 percent were Saudi nationals. The ratio of men to women was around 1:1. Students from the third, fourth, and The students' opinions of the knowledge they learned from PBL and conventional lectures are shown in Table 1. Regarding the quantity of recalled knowledge or the delivery of a big

tradition- al lectures regarding:

1. Knowledge gained (4 items): Learning method that helps in recalling basic knowledge, providing large quantity of information within a shorter time, linking knowledge of basic and clinical sciences, etc.
2. Attitude (6 items): Students' feelings toward both methods regarding constructive learning, motivation, learning in a shorter time, etc.
3. Skills gained (8 items): Skills provided from both methods as critical thinking, effective communication, team building, searching skills, lifelong learning skills, etc.
1. Future outcome (1 items): A statement inquired about students' preference of either method regarding expectation of their future outcome (through studying by each method).
2. Satisfaction (1 items): A statement inquired about students' preference of either method according to their learning satisfaction.

Statistical analysis

After being coded, the information was entered into a statistical computer program (SPSS Inc., version 21.0; Chicago, Ill., USA). Each of the following was given a total score for both PBL and regular lectures: knowledge, attitude, academic performance, skills, and satisfaction. Both descriptive and analytical statistics were performed; two means were compared using the t test, and a significance level of $P < .05$ was applied.

fifth years made up 36.7%, 39.3%, and 23.9% of the sample, respectively. Most participants had family incomes that were both sufficient and above average. Most of the pupils' mothers (56.5%) and fathers (71.3%) had a bachelor's degree or above.

amount of information in a shorter length of time, there was no statistically significant difference between the two techniques ($P > .05$). It was found that students favored problem-

based learning (PBL) over standard lectures (score = 3.30 [1.12]) because PBL allowed them to better connect their understanding of basic and clinical sciences. There was a discernible and highly statistically significant difference (t test = 10.16, $P < .001$).

The opinions of medical students about the two teaching approaches in terms of learning attitudes are shown in Table 2. Learning attitude is improved by PBL. Students chose PBL because it increased their enthusiasm to learn, allowed them to learn in a constructive way, and helped them discuss material in a formal manner. There were highly significant differences ($P < .001$) between the opinions of the pupils on the two strategies.

Table 3 illustrates that, when it came to improving their learning skills, students

favoured PBL over regular lectures, with extremely significant differences ($P < .001$). These abilities include critical thinking, effective communication, teamwork, self-directed learning, self-evaluation, and the capacity to adapt to change. The average overall skill acquired by PBL (47.20 [10.68]) was much greater than the average skill obtained through traditional lectures (33.01 [9.97]), exhibiting a statistically significant difference (t test=20.97, $P < .001$). Additionally it was clear that students preferred PBL over regular lectures in terms of satisfaction ($P < .001$). A higher mean score was given for PBL compared to traditional lectures for providing better future learning outcome, with a highly statistical significant difference ($P < .001$)

Discussion

Innovative evidence-based reform is currently being implemented in medical education, with a focus on student-centered techniques such as PBL and enhanced reliability. (17) Walsh claimed that PBL uses the clumsy, difficult situations that arise in everyday life as a model for learning. (18) The amount of information recalled from PBL or regular lectures does not differ statistically significantly, according to the study's findings. This discovery aligns with the outcomes from Indiana University School of Dentistry, USA, and the Netherlands, (19,20) meta-analysis review.

Nonetheless, because PBL strengthens the informational connection between basic and clinical sciences, students in this study favored it over regular lectures. This is consistent with the Indiana study's findings. (21) PBL was preferred over traditional lectures in terms of attitudes, with students showing more positive attitudes toward learning than lectures, according to the current study, which indicated a statistically significant difference. A study carried out in Riyadh produced comparable findings, as reported by Cowan et al. (22). Most of their students (sixty percent) thought that the student-centered method improved their instruction. In the meantime, the perceptions of PBL in pharmacology studies were evaluated by Gregson et al. (23).

They discovered that pupils were more confident in their information and understood it better after participating in PBL. Medical students' interest in didactic lectures is declining, according to a different study done in Nigeria.17 Additionally, 40 Iranian nursing students participated in a randomized clinical trial, with 20 of them assigned to a PBL group and the remaining 20 to a standard lecture group. According to the results, there was a statistically significant difference in the students' degree of learning attitude, with the PBL group having a more positive attitude.(24) PBL students scored much higher than traditional lectures ($P < .05$) in terms of future learning outcomes, according to the current study. The use of PBL clerkship was also linked to improved National Board of Medical Examiners results, according to research by Curtis et al.. (25). In this investigation, students favored PBL skills over conventional lecture content. They believe that PBL prepares them more for self-directed learning, traditional lectures, communication, team building, critical thinking, and summarizing. There were substantial differences ($P < .001$) that were very statistically significant. These findings are consistent with those of Schmidt et al. (26), who found that Dutch graduates of PBL-implemented schools assessed their own interpersonal competences and skills to be much higher than those of other graduates. Compared to other graduates, they thought they had superior problem-solving, self-directed learning, information-gathering, and task-supporting skills.

(26, 27) These findings also line up with those of a different Hong Kong study. (28) Results on the critical thinking dispositions of nursing students in Asian and non-Asian countries, however, were inconsistent and varied according to the study (24), which employed Thinking Disposition Inventory measures. Ultimately, the results of this study demonstrated that PBL results in higher student satisfaction than standard lectures. According to the results, just 20% of students at the traditional campus expressed satisfaction with their curriculum, 75% of students at the PBL school did. (29) In a follow-up study on medical students studying anesthesia through hybrid curricula, Chang et al. (30) discovered that the majority of students favored PBL over standard lecture-based instruction.

Conclusion

In summary, the current study found that more medical students were drawn to PBL as a teaching technique. Students liked PBL over lectures because it made a stronger connection between

information in basic and clinical sciences. $P > .05$. PBL was favored by medical students above traditional lectures in terms of enhancing the majority of learning outcome domains. PBL, in the view of medical students, gives them a better mindset toward learning, better learning abilities, greater happiness, and better outcomes in their future as future doctors. More PBL integration with traditional lectures is required by the medical faculty in order to improve several learning domains, including attitude, skills, and learning outcomes. The study recommended that PBL be implemented in all faculties and schools in order to improve student learning and skill levels. Further research on medical graduates who completed the hybrid PBL program is needed to assess the knowledge and abilities they acquired and ascertain how well-prepared they were for practice following graduation.

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Table 1. Comparison between medical students' perception of knowledge gained from both problem-based learning and traditional lecture.

Students' attitude Type	Mean score	SD	t-test	P
Method helps recalling knowledge inPBL basic	3.76	1.15	1.60	.111
Lectures	3.90	1.05		
Method provides better link between knowledge of basic and clinical sciences PBL	4.05	1.15	10.16	.001a
Lectures	3.30	1.12		
Method provides intact content from learning neededPBL	3.50	1.12	0.230	.817
Lectures	3.52	1.18		

Method provides a large quantity ofPBL information within a shorter time		3.47	1.35	0.675	.501
	Lectures	3.50	1.30		

PBL: Problem-based learning.

Table 2. Comparison between medical students' perception of problem-based learning and traditional lectures regarding attitudes toward learning.

Attitude	Type	Mean score	SD	t test	P
I feel that I am comfortable in learning with this	PBL	3.55	1.350	0.705	.483
	Lectures	3.51	1.272		
I feel that I learn in a shorter time	PBL	3.43	1.320	4.580	<.001
	Lectures	3.33	1.262		
I feel that I learn better in this	PBL	3.60	1.180	4.708	<.001
	Lectures	3.20	1.115		
I feel that this method motivates	PBL	3.70	1.250	10.860	<.001
	Lectures	2.38	1.180		
I feel that this method is more	PBL	3.66	1.90	5.710	<.001
	Lectures	3.20	1.082		
I feel that this me to discuss information in a	PBL	3.92	1.142	14.904	<.001
	Lectures	2.80	1.225		

PBL: Problem-based learning.

Table 3. Comparison between medical students' perception of skills, satisfaction, and outcome gained from problem-based learning and traditional lecture

Skills	Type	Mean score	SD	t test	P
Critical thinking	PBL	4.15	1.40	14.70	<.001
	Lectures	2.85	1.20		
Team building	PBL	4.05	1.15	21.90	<.001
	Lectures	2.35	1.10		
Effective communication	PBL	4.15	1.12	23.08	<.001
	Lectures	2.40	1.11		
Self-directed learning	PBL	4.11	1.10	17.99	<.001
	Lectures	2.70	1.30		
Self-assessment	PBL	3.85	1.20	14.70	<.001
	Lectures	2.70	1.20		
Problem solving	PBL	4.05	1.11	19.61	<.001
	Lectures	2.60	1.20		
Coping with change	PBL	3.85	1.12	14.80	<.001
	Lectures	2.76	1.15		
Life-long learning	PBL	3.80	1.15	9.40	<.001
	Lectures	3.07	1.22		
Total skills score	PBL	47.20	10.68	20.97	<.001
	Lectures	33.01	9.97		
Satisfaction with PBL	PBL	3.75	1.28	4.95	<.001
	Lectures	3.35	1.25		
Provides better learning outcome for myPBL future	PBL	3.80	1.25	5.25	<.001
	Lecture	3.35	1.30		

PBL: Problem-based learning