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Role Of Problem-Based-Learning (PBL) In Producing Seven-Star Doctors: A Cross-Sectional Survey

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Abstract

Objective: This study aims to investigate how Sialkot Medical College first-, second, and third-year MBBS students rate the impact of problem-based learning (PBL) on the development of qualities linked to seven-star doctors.

Methods: A six-month study (June–December 2023) at Sialkot Medical College used convenience sampling to survey 173 MBBS students (years 1,2 & 3) on their PBL experiences. A self-designed, expert-reviewed, and pilot-tested questionnaire assessed demographic details and Likert-scale statements linked to Seven-Star Doctor attributes. Data was collected via Google Forms and analysed using SPSS. Statistical analysis, including descriptive statistics and P values, was utilised to interpret the responses.

Results: The results showed that 54.9% of students said PBL motivated them to promote community health, and 71.1% of students believed it significantly improved their ability to think critically. Additionally, 64.7% of participants agreed that PBL improved their capacity to use theoretical knowledge in practical settings. In terms of professionalism, 57.2% of participants agreed PBL aided their professional development, and 55.5% said it promoted a scholarly attitude. Additionally, 68.8% were positive that PBL was crucial for developing leadership skills.

Conclusion: The study acknowledges the positive effects of PBL in developing the traits of a seven-star doctor while also pointing up areas for further investigation and potential enhancements in PBL implementation. Considering the limitations of the study, to further understand PBL's impact on medical education, future research should strive for bigger, more varied sample sizes and more advanced study designs.

Keywords: Learning, Problem Based Learning, Health Personnel, "Education, Medical", ‘Competencies, Clinical’.

Introduction

Medical education plays a key role in producing skilled and empathetic healthcare professionals.[1] Medical education has traditionally been built on lectures; however, this method cannot adequately educate students to manage the complexity of contemporary healthcare environments.[2] Problem-Based Learning (PBL) has emerged as a viable substitute that encourages students to actively participate in resolving actual clinical issues. The main focus of students' learning experiences in Problem-Based Learning (PBL), an active learning approach, is solving real-world problems.[3] In PBL, students evaluate complex, open-ended problems in small groups, which provide opportunities for working together, critical thinking, and research.[4] They obtain the information they need, formulate theories, and come up with solutions—often with the help of a facilitator instead of a conventional lecturer. PBL takes place during two sessions. The first four steps, as illustrated in Figure 1, are completed in the first session, and the sixth and seventh steps, as illustrated in Figure 1, are completed in the second session. Students have the opportunity to study alone in between two sessions (Fifth step).[5]

Contributions:
S.Z, F.I, W.K - Conception of study - Experimentation/Study Conduction
S.Z, F.I, S.A, S.J, A.R, W.K - Analysis/Interpretation/Discussion
S.A, W.K - Manuscript Writing
S.Z, F.I, S.A, S.J, A.R, W.K - Critical Review

All authors approved the final version to be published & agreed to be accountable for all aspects of the work.

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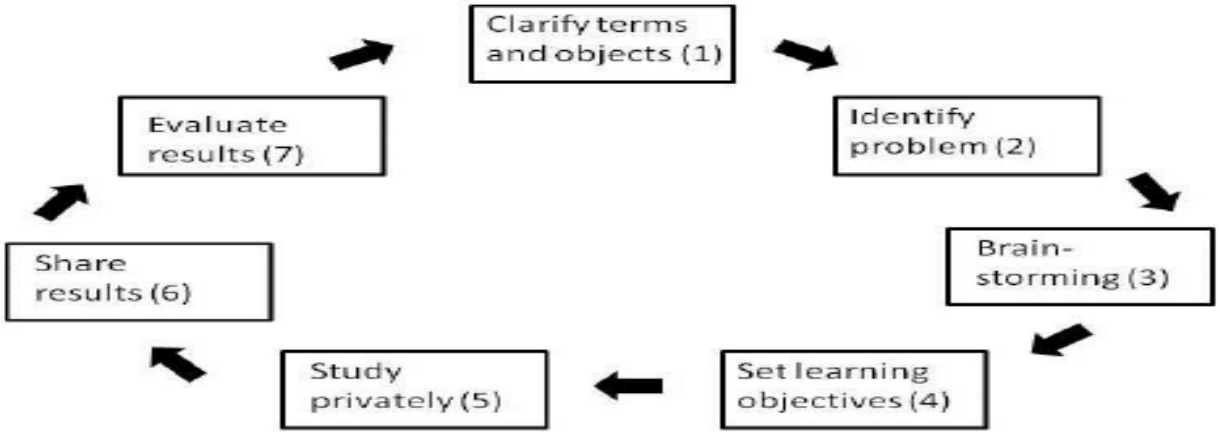

Figure 1: The Maastricht seven-jump process (Wood, 2003; Albanese, 2010).

PBL attempts to make learning relevant to real-world situations so that students may understand how their knowledge is practical. It promotes collaboration, communication, and teamwork skills, as students work together to tackle complex problems. PBL encourages deep critical thinking and the ability to analyse, synthesise, and evaluate information. Students take responsibility for their learning by actively seeking resources, conducting research, and constructing solutions.[6]

The phrase "seven-star doctor" was coined by the Pakistan Medical and Dental Council (PMDC) to express the fundamental skills that a Pakistani physician ought to possess after graduating. The Pakistan Medical and Dental Council states that a seven-star doctor should possess the following general competencies: 1. Skilful, 2. Knowledgeable 3. Community Health Promoter 4. Critical Thinker 5. Professional 6. Scholar 7. Leader and Role Model.[7] These competences cover a variety of abilities, know-how, and dispositions needed to provide excellent healthcare and advance the welfare of people, families, and communities. A Seven Star Doctor is distinguished by their proficiency in clinical practice, extensive scientific knowledge, dedication to community health, critical thinking abilities, professional conduct, commitment to lifelong learning, research aptitude, and leadership potential. By maintaining moral principles and actively promoting the development of medical education and healthcare, they act as role models. The Seven Star Doctor stands out as a model of excellence in the medical industry because of its diverse approach to practice.[8] The Seven-Star Doctor framework offers a methodical way to comprehend the skills that medical graduates need to have, and PBL is ideally suited to cultivating these qualities. Beyond rote memorisation, PBL allows students to acquire and apply knowledge in meaningful ways by promoting active participation and self-directed learning.[9]

The purpose of this study is to investigate how Sialkot Medical College's first-, second, and third-year MBBS students perceive the impact of problem-based learning (PBL) on the growth of key competencies of a seven-star doctor.

Materials And Methods

This was a cross-sectional study that lasted six months, from June 2023 to December 2023. The sampling technique involved convenience sampling. The study included first, second and third-year MBBS students at Sialkot Medical College who had experienced Problem-Based Learning sessions. The participants were included based on accessibility and willingness to participate. The sample size of 169 was determined using calculater.net online sample size calculator using a 95% confidence interval, 5% margin of error and 50% population proportion. The participants who did not give consent to participate were not included. Out of the total of 291 students invited to participate, 173 responded to the questionnaire. A self-designed, closed-end 12-item questionnaire comprising Demographic Information, i.e. age, gender, year of study and Nine Likert-scale Statements, corresponding to attributes associated with Seven Star Doctors, was developed. To determine the statements, the researchers carried out a comprehensive literature review. Two medical education specialists reviewed the questionnaire after it was developed. Experts assessed each item as either relevant, useful but not relevant, or not relevant. Most of the questions' "not relevant" scores were modified or removed. Following the modifications, the questionnaire was reassessed by the medical education specialists. Pilot testing using 5% of the sample size was carried out. Internal consistency was excellent (Cronbach's α=0.868). The questionnaire was then distributed via social media platforms to the target population. Data was collected through Google Forms, ensuring a streamlined and efficient process. Data was analysed using statistical software SPSS, and descriptive statistics, t-test and chi-square tests (*p*<0.05 significant) were applied. The study was approved by the Institutional Review Board, Sialkot Medical College, Sialkot (IRB no MRC/IRB/23014). The research was conducted by the ethical standards outlined by the Declaration of Helsinki. Informed consent was obtained from all participants, and confidentiality of data was maintained throughout the study process.

Results

A total of 173 students participated in the survey, comprising 126 females and 46 males (Figure 2). The age of the participants ranged from 17 years to 24 years, with a Mean age of 20.19 years (Figure 3). The respondents included 67 students from 1st-year MBBS, 51 from 2nd-year MBBS, and 55 from 3rd-year MBBS (Table 1).

Table 1: Year of Study and number of participants

Year of Study			
		Frequency	Percent
Valid	1	67	38.7
	2	51	31.8
	3	55	29.5
	Total	173	100.0

The frequency of responses in the data revealed that 71.1% of participants agreed that PBL plays a significant role in enhancing critical thinking skills. Additionally, 54.9% viewed PBL as a platform that encourages community health promotion. Furthermore, 64.7% agreed that PBL facilitated the practical application (Skilful) of theoretical knowledge.

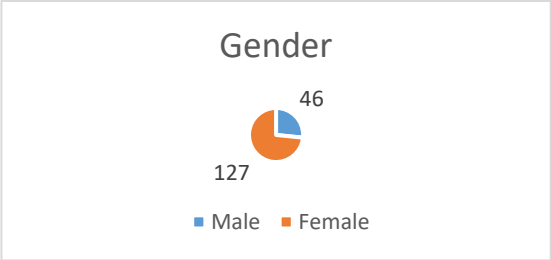

Figure 2: Gender

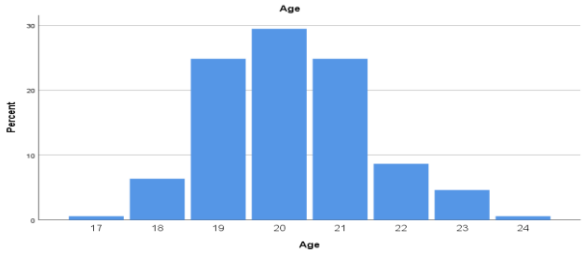

Figure 3: Age of participants

In terms of professionalism, 57.2% of participants believed that PBL fostered their professional development, while 55.5% felt that it contributed to their scholarly approach. Notably, 68.8% believed that PBL helped them develop leadership skills. The percentage and Likert scale responses to the questions are given in Table 2.

Table 2: Participants' Responses on PBL's Role in Different Attributes

		Strongly disagree	Disagree	Neutral	Agree	Strongly Agree	Total	P Value* Year of Study	P value* Gender
PBL influenced your critical thinking skills.	Frequency	10	7	33	79	44	173	0.393	0.748
	Percent	5.8	4.0	19.1	45.7	25.4	100.0		
PBL helps in understanding the practical application of theoretical knowledge.	Frequency	11	7	43	63	49	173	0.046	0.955
	Percent	6.4	4.0	24.9	36.4	28.3	100.0		
PBL improves my communication skills with peers and instructors.	Frequency	8	10	24	66	65	173	0.915	0.454
	Percent	4.6	5.8	13.9	38.2	37.6	100.0		
PBL promotes teamwork and collaboration among students.	Frequency	10	9	30	62	62	173	0.627	0.132
	Percent	5.8	5.2	17.3	35.8	35.8	100.0		
PBL helps in understanding the ethical aspects of medical practice.	Frequency	6	16	49	62	40	173	0.331	0.656
	Percent	3.5	9.2	28.3	35.8	23.1	100.0		
Participating in PBL has made me more aware of professional responsibilities.	Frequency	9	18	47	57	42	173	0.439	0.280
	Percent	5.2	10.4	27.2	32.9	24.3	100.0		
PBL as a platform encourages you to become a Community Health Promoter	Frequency	9	17	52	60	35	173	0.040	0.319
	Percent	5.2	9.8	30.1	34.7	20.2	100.0		
PBL fosters a scholarly approach to learning.	Frequency	7	14	56	65	31	173	0.076	0.845
	Percent	4.0	8.1	32.4	37.6	17.9	100.0		
Engagement in PBL activities influences your perception of leadership and role modelling.	Frequency	9	5	40	67	52	173	0.259	0.293
	Percent	5.2	2.9	23.1	38.7	30.1	100.0		

Overall, the findings indicate a positive role of PBL in supporting the development of various attributes associated with the Seven-Star Doctor. The results suggest that a significant proportion of students agree that PBL contributes to the enhancement of skills such as critical thinking, knowledge application, professionalism, community health promotion, scholarly approach, and leadership development. Among students across different years of study, there was no significant difference in their assessment of attributes of seven-star doctors enhanced by participating in problem-based learning sessions, except for understanding practical application of theoretical knowledge (p value=0.046) and community health promotion (p value=0.040). Independent t-tests revealed no significant differences between males and females in perceptions of PBL's impact on critical thinking (t=1.280, p=0.202), leadership (t=1.757, p=0.081), or other Seven-Star Doctor competencies (all p>0.05). (Table 3). First-year students rated PBL's impact on communication skills (t= -0.726, p= 0.469) and leadership (t= -0.194, p= 0.846) slightly higher than second-year students. When compared with third-year students, first-year students rated PBL's impact on community health promotion (t= -0.048, p=0.962), scholarly learning approach (t= -1.181, p=0.240), and leadership (t= -0.626, p=0.533) slightly more.

Table 3: Group comparisons of PBL effectiveness ratings using independent t-tests: t-values and significance levels (*p*).

Independent Samples Test									
		t-test for Equality of Means							
		Male Vs Female		First Year Vs Second Year		First Year Vs Third Year		Second year Vs Third year	
		t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)	t	Sig. (2-tailed)
PBL influenced your critical thinking skills.	Equal variances assumed	1.280	0.202	0.037	0.971	-0.328	0.744	-0.326	0.745
	Equal variances not assumed	1.335	0.185	0.036	0.971	-0.322	0.748	-0.328	0.744
PBL helps in understanding the practical application of theoretical knowledge.	Equal variances assumed	0.452	0.652	0.624	0.534	0.117	0.907	-0.423	0.673
	Equal variances not assumed	0.453	0.652	0.622	0.535	0.115	0.909	-0.426	0.671
PBL improves my communication skills with peers and instructors.	Equal variances assumed	1.083	0.280	-0.726	0.469	0.876	0.383	1.527	0.130
	Equal variances not assumed	1.134	0.260	-0.743	0.459	0.867	0.388	1.542	0.126
PBL promotes teamwork and collaboration among students.	Equal variances assumed	1.113	0.267	0.711	0.478	0.523	0.602	-0.136	0.892
	Equal variances not assumed	1.166	0.247	0.725	0.470	0.519	0.605	-0.137	0.891
PBL helps in understanding the ethical aspects of medical practice.	Equal variances assumed	0.773	0.441	0.974	0.332	0.301	0.764	-0.601	0.549
	Equal variances not assumed	0.787	0.434	0.979	0.330	0.298	0.766	-0.604	0.547
Participating in PBL has made me more aware of professional responsibilities.	Equal variances assumed	0.319	0.750	0.152	0.880	0.622	0.535	0.433	0.666
	Equal variances not assumed	0.303	0.763	0.150	0.881	0.608	0.545	0.435	0.664
PBL as a platform encourages you to become a Community Health Promoter	Equal variances assumed	1.234	0.219	1.533	0.128	-0.048	0.962	-1.221	0.225
	Equal variances not assumed	1.291	0.200	1.489	0.140	-0.046	0.963	-1.229	0.222
PBL fosters a scholarly approach to learning.	Equal variances assumed	0.798	0.426	0.097	0.923	-1.181	0.240	-1.177	0.242
	Equal variances not assumed	0.845	0.401	0.096	0.923	-1.165	0.247	-1.183	0.240
Engagement in PBL activities influences your perception of leadership and role modelling.	Equal variances assumed	1.757	0.081	-0.194	0.846	-0.626	0.533	-0.406	0.686
	Equal variances not assumed	1.847	0.068	-0.194	0.846	-0.622	0.535	-0.407	0.685

Discussion

The quantitative findings from the questionnaire highlight the positive impact of Problem-Based Learning in medical education. Most students perceived PBL as an effective method for improving critical thinking, problem-solving abilities, communication, teamwork, and overall learning experience. These findings align with existing literature on PBL's benefits, emphasising its role in producing Seven-Star Doctors. [10] Engaging students in active learning scenarios, PBL equips them with the skills necessary for successful medical practice, beyond just clinical competence. The overwhelmingly positive response to PBL in this study is consistent with prior research by Harris, N, Bacon CEW in 2019. This indicates a clear preference among students for this active learning approach. PBL's emphasis on real-world problem-solving resonates with students' expectations of practical applicability in medical education.[11] The significant improvement in critical thinking and problem-solving abilities aligns with the fundamental goals of PBL. A study by Susan A. et al in 2020 have consistently shown that PBL fosters higher-order cognitive skills, preparing students for the complex challenges of modern healthcare.[12] The collaborative element of PBL is mirrored in the favourable effects on communication and teamwork abilities, which were also noted by Du et al. in 2020. Students who work in small groups mimic the interprofessional dynamics of healthcare practice by learning how to successfully communicate, share knowledge, and capitalise on one another's talents.[13] The majority's support for PBL's beneficial effects on their educational journey highlights how it may foster an interesting and stimulating learning environment. This is consistent with a study in 2020 by McCurdy RP et al. that emphasised the significance of student motivation and engagement for optimal learning outcomes.[14] The stated growth in professionalism and leadership qualities lends even more credence to PBL's all-encompassing methodology. This result is consistent with research conducted in 2019 by Miner-Romanoff K. and colleagues, which emphasised the importance of these attributes in creating well-rounded healthcare professionals.[15] The Majority of students reported that their communication skills significantly improved in PBL, a skill essential for a seven-star doctor. This is in harmony with the study conducted by Setia S etal in 2024.[16] The positive perception of PBL's impact on community health promotion aligns with previous studies highlighting the benefits of this pedagogical approach.[17] Analysis of students' perceptions regarding different attributes revealed variations among different years of study. Notably, these variations were not statistically significant for most aspects. However, some exceptions emerged, including the perception of understanding the practical application of theoretical knowledge and community health promotion due to the PBL session. Studies by some authors agree that PBLs foster community health promotion.[18] The observed variations in responses among different years of study warrant a closer examination of factors contributing to differing perceptions. Given these encouraging results, it is imperative to talk about the real-world ramifications for medical schools. How can educators use PBL's advantages to improve community health promotion and the real-world application of academic knowledge? PBL needs to be smoothly incorporated into the medical curriculum to maximise its advantages. PBL scenarios should be in line with learning objectives, key competencies, and practical clinical applications, according to educators.[19] By including community-based projects into its structure, PBL's focus on promoting community health can be further strengthened. Students could interact with marginalised communities, work on actual public health problems, and provide evidence-based solutions. Their comprehension of health inequities would be improved by this practical experience, which would also reaffirm the social responsibility components of medical education.[20] The encouraging results of this study urge more discussion among those involved in medical education.

Conclusions

Most participants acknowledged that PBL plays a significant role in developing key competencies aligned with the Seven Star Doctor framework among MBBS students. The variations in opinions on the promotion of community health and the real-world application of theoretical knowledge, however, imply that additional PBL methodology improvement may be required to improve these areas. Future studies should explore ways to optimise PBL to ensure a more balanced development of all Seven Star Doctor attributes across diverse student populations. Considering the limitations of the study, to further understand PBL's impact on medical education, future research should strive for bigger, more varied sample sizes and more advanced study designs, such as a mixed methods study to obtain both quantitative and qualitative results.

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