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A Qualitative Inquiry into Anatomy Teachers' Insights and Experiences with the use of Problem-based Questions in Medical Undergraduates Course of Bangladesh

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Abstract

Background: Inclusion of problem-based questions in the teaching and assessment of medical undergraduates of Bangladesh is crucial for making a skilful physician in future. Teachers play an important role in teaching and assessment. Hence, it is very important to know the perceptions of teachers regarding the pivotal role of problem-based questions and their experiences. **Objective:** This study aimed to analyze the perceptions, views and experiences of Anatomy teachers of Bangladesh regarding problem-based questions. **Methods:** It was a cross-sectional descriptive study. Bangladesh Medical and Dental Council (BM&DC) registered postgraduate degree holders in Anatomy were selected as participants. Data were collected using a pretested self-administered questionnaire, and responses were scored using a five-point Likert scale. **Results:** The survey results on the perceptions, views and experiences of the Anatomy teachers of Bangladesh regarding problem-based questions were unified in four (4) out of five (5) sets of criteria that problem-based questions had influential role on undergraduates' "thought process", "identifying undergraduates' strengths and weaknesses", "improving skill and clinical reasoning ability", and "intensification of exam preparation". Here, the mean scores for the majority of the responses did not vary much. However, their opinions differed in "experience on constructing PBQs" with a varying range of mean scores from 2.81 ± 1.57 to 4.97 ± 0.18 . **Conclusion:** Teachers of Bangladesh agreed that the incorporation of problem-based questions in regular discussion as well as in assessment will help the undergraduates to develop their clinical skills. Appropriate training of the teachers regarding problem-based questions is mandatory for improving the quality of teaching and assessment.

Keywords: Problem-based question, Medical undergraduates, Anatomy Teachers

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Original Article

Introduction

Anatomy is one of the fundamental and first subjects that medical undergraduates face during their MBBS life. Knowledge of Anatomy is necessary for the development of their specialized skills that will help them to be good physicians in future. Anatomy is a difficult one to memorise because of the large number of medical terminologies and the detailed discussion of every organ and system. Learning Anatomy in a clinically relevant format will help the undergraduates in better understanding than the traditional one².

A thorough understanding of Anatomy is essential for general practitioners, surgeons, and all clinicians involved in invasive diagnostic and therapeutic procedures³. Experts in the clinical sciences consider sound anatomical knowledge is a fundamental prerequisite for safe and effective medical interventions⁴. Consequently, strong grounding in Anatomy provides a solid foundation that facilitates the development of competent and effective physicians.

Learning is an important process to improve the knowledge and skills of a student, which helps in reaching specific goals. During teaching, the use of clinical scenarios will

help the students to correlate their learned knowledge with real-life situations. Learning will be more effective if the learners can utilize it effectively in a wide variety of situations.

Preston et al. stipulated that the learning of undergraduates is greatly influenced by their assessment⁵. In our country, for the assessment of medical undergraduates, the written assessment is an essential determinant. Written test not only proves undergraduates' ability to recall facts, but also can evaluate higher-order cognitive domains, such as problem-solving skills⁶.

Short answer questions (SAQs) are a part of the written assessment included in the curriculum for undergraduate medical education in Bangladesh since 2002. As SAQs are a useful tool to assess the higher level of cognitive domain of the undergraduates, the curriculum has recommended to include 10% questions from the application-level during the construction of question papers. However, the remaining 70% and 20% questions are supposed to be from the recall and understanding level respectively⁷.

Yasmin analyzed the abilities of medical undergraduates to answer problem-based objective written questions compared to

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traditional clinically-oriented objective written questions on Regional Anatomy⁸. Unfortunately, the performance of the undergraduates was significantly poorer in answering problem-based than traditional, clinically-oriented, objective written questions. Therefore, inclusion of clinical scenarios during the teaching session and the assessment of medical undergraduates is a must to improve their skills.

Before concluding, it is important to know the perceptions of teachers regarding problem-based questions. In Bangladesh, there were no previous studies to know their perceptions regarding problem-based questions. The present study aimed to analyze the perceptions, views and experiences of Anatomy teachers of Bangladesh regarding problem-based questions.

Methods

This cross-sectional study was approved by the Ethical Review Committee of the Institutional Review Board (IRB), Bangladesh Medical University (BMU), Bangladesh. The study population was Bangladesh Medical and Dental Council (BM&DC) registered postgraduate degree holders in Anatomy and were willing to participate in this research.

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Information about the participants was collected from the telephone directory of the Anatomical Society of Bangladesh and from the heads of the departments of the different medical colleges. A phone call was made to approach all the eligible Anatomy teachers. The contact numbers of some were unavailable. A list of eligible Anatomy teachers was made who agreed to participate. About a hundred eligible teachers agreed verbally to participate in the study. A questionnaire was constructed which encompassed different aspects of problem-based questions. The questions were prepared and modified methodically by the didactic professionals to ensure the validity of the questionnaire. A pilot study was conducted. An invitation letter and informed consent form for participating in this study were sent to the participant's email and/or WhatsApp. A link of Google Form containing the questionnaire, with qualitative components scored on a Likert scale, was also distributed via email and WhatsApp to the participants. Google Form accepted one response per email to prevent the duplication of responses.

The participants were aware of their right to decline participation in the study at any point, and their responses were kept confidential.

Finally, data were collected from thirty participants between January and March 2021.

Feedback regarding problem-based questions was collected in a typical five-level Likert question:

- Definitely (score 5)
- Probably (score 4)
- Possibly (score 3)
- Probably not (score 2)
- Definitely not (score 1)

Treating Likert-derived data as ordinal-level data, the responses for each question were presented in percentage frequency. The data were analyzed using SPSS version 24.

Results

After collecting data, answers were categorized based on different issues. The frequency of each category was determined. The result has been presented in the form of texts, tables and figures.

Surveyed responses from the Anatomy teachers of Bangladesh regarding

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“Influence of PBQs on undergraduates’ thought process”

Table 1 depicts the responses of Anatomy teachers of Bangladesh regarding the “influence of PBQs on undergraduates’ thought process”. A fairly large percentage of teachers thought that PBQs will “Definitely” improve undergraduates’ critical (83.3%) and creative (70%) thinking. Solving more PBQs will make undergraduates’ thoughts more versatile, as mentioned as “Definitely” by 83.3% and “Probably” by 16.7% of the teachers respectively. In case of augmentation of unambiguous thinking, about 73% of the teachers marked the statement as “Definitely” and 20% as “Probably”. About 63% of them “Definitely” thought that PBQs are helpful for a deeper comprehension of facts. The statement was mentioned as “Probably” by 36.7% of the teachers. The resulting scores of these responses did not vary much and ranged from 4.63 ± 0.49 to 4.83 ± 0.38 .

Table 1 Survey-based feedback from Anatomy teachers of Bangladesh regarding the “influence of PBQs on undergraduates' thought process” (n=30)

Questionnaire regarding problem-based question (PBQ)	Response of the Anatomy teacher					Mean score $\pm$ SD
	Definitely f (%)	Probably f (%)	Possibly f (%)	Probably not f (%)	Definitely not f (%)	
Do you think PBQs can improve undergraduates' critical thinking?	25 (83.3)	3 (10.0)	1 (3.3)	1 (3.3)	0 (0.0)	4.70 $\pm$ 0.84
Do you think solving PBQs will evoke their creative thinking?	21 (70.0)	7 (23.3)	2 (6.7)	0 (0.0)	0 (0.0)	4.63 $\pm$ 0.61
Do you think solving more PBQs will make their thought more versatile?	25 (83.3)	5 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	4.83 $\pm$ 0.38
Do you think PBQs will augment undergraduates' capability to think more unambiguously?	22 (73.3)	6 (20.0)	2 (6.7)	0 (0.0)	0 (0.0)	4.67 $\pm$ 0.61
Do you think PBQs will help for a deeper comprehension of a fact?	19 (63.3)	11 (36.7)	0 (0.0)	0 (0.0)	0 (0.0)	4.63 $\pm$ 0.49

Surveyed responses from the Anatomy teachers of Bangladesh regarding the “Role of PBQs in identifying undergraduates' strengths and weaknesses”

Table 2 shows the responses of Anatomy teachers of Bangladesh regarding the “role of PBQs in identifying undergraduates' strengths and weaknesses”. About 57% of the teachers thought that solving PBQs would help undergraduates to identify their strengths. “Probably” and “Possibly” each

were marked by 20%. PBQs regarding identifying weaknesses of undergraduates, 43.3% were convinced of the statement as “Definitely”, also 36.7% and 16.7% of the teachers marked the statement as “Probably” and “Possibly” respectively.

Original Article

Table 2 Survey-based feedback from the Anatomy teachers of Bangladesh regarding the “Role of PBQs on identifying undergraduates' strengths and weaknesses” (n=30)

Questionnaire regarding problem-based question (PBQ)	Response of Anatomy teacher					Mean score ± SD
	Definitely f (%)	Probably f (%)	Possibly f (%)	Probably not f (%)	Definitely not f (%)	
Do you think solving PBQs will help to identify undergraduates' strength and boost their confidence?	17 (56.7)	6 (20.0)	6 (20.0)	1 (3.3)	0 (0.0)	4.30±0.92
Do you think PBQs will help to identify undergraduates' weakness better than traditional one?	13 (43.3)	11 (36.7)	5 (16.7)	1 (3.3)	0 (0.0)	4.20±0.85

Surveyed responses from the Anatomy teachers of Bangladesh regarding the “Role of PBQs in improving undergraduates' skill and clinical reasoning ability”

Table 3 shows the responses of Anatomy teachers of Bangladesh regarding the “Role of PBQs in improving undergraduates' skill and clinical reasoning ability”. Almost all (90%) of the teachers were convinced of the statement that PBQs will “Definitely” improve undergraduates' brainstorming ability. About 87% of them mentioned that PBQs can “Definitely” help in better integration of basic and clinical sciences. About 67% of them thought that PBQs would “Definitely” improve their decision-making skills. The statement was marked as

“Probably” by 26.7% teachers. Around 77% of them thought that PBQs will “Definitely” sharpen undergraduates' problem-solving capabilities. The statement regarding improving communication skills was marked as “Definitely”, “Probably” and “Possibly” by 33.3%, 26.7% and 26.7% teachers, respectively. Around 83% of teachers mentioned that PBQs will “Definitely” make their clinical reasoning better, where 16.7% marked it as “Probably”. The mean scores for these responses varied from 3.80 ± 1.06 to 4.83 ± 0.59 .

Original Article

Table 3 Survey-based feedback from Anatomy teachers of Bangladesh regarding the 'role of PBQs in improving undergraduates' skill and clinical reasoning ability' (n=30)

Questionnaire regarding problem-based question (PBQ)	Response of Anatomy teacher					Mean score $\pm$ SD
	Definitely f (%)	Probably f (%)	Possibly f (%)	Probably not f (%)	Definitely not f (%)	
Do you think PBQs will improve undergraduates' brainstorming abilities?	27 (90.0)	2 (6.7%)	0 (0.0)	1 (3.3)	0 (0.0)	4.83 $\pm$ 0.59
Do you think PBQs can help in better integration between basic and clinical sciences?	26 (86.7)	2 (6.7)	1 (3.3)	1 (3.3)	0 (0.0)	4.77 $\pm$ 0.68
Do you think PBQs will help to improve undergraduates' decision-making skills?	20 (66.7)	8 (26.7)	1 (3.3)	1 (3.3)	0 (0.0)	4.57 $\pm$ 0.73
Do you think PBQs will sharpen undergraduates' problem solving capabilities?	23 (76.7)	6 (20.0)	1 (3.3)	0 (0.0)	0 (0.0)	4.73 $\pm$ 0.52
Do you think PBQs improve communication skills?	10 (33.3)	8 (26.7)	8 (26.7)	4 (13.3)	0 (0.0)	3.80 $\pm$ 1.06
Do you think PBQs will trigger undergraduates' clinical reasoning ability?	25 (83.3)	5 (16.7)	0 (0.0)	0 (0.0)	0 (0.0)	4.83 $\pm$ 0.38

Surveyed responses from the Anatomy teachers of Bangladesh regarding the "Role of PBQs in intensification of exam preparation"

Table 4 depicts the responses of Anatomy teachers regarding the "Role of PBQs in intensification of exam preparation". In terms of information gathering and elaboration of knowledge, 63.3% and 76.7% teachers respectively responded "Definitely". These statements were marked as "Probably" by

23.3% and 20.0% of teachers, respectively. About 60% Anatomy teachers thought that PBQs would "Definitely" sharpen their preparation, whereas about 23.3% Anatomy teachers marked this statement as "Probably". For these responses, the mean scores ranged from 4.43 $\pm$ 0.77 to 4.73 $\pm$ 0.52.

Table 4 Survey-based feedback from Anatomy teachers of Bangladesh regarding the “Role of PBQs in intensification of exam preparation”

Questionnaire regarding problem-based question (PBQ)	Response of Anatomy teacher					Mean ± SD
	Definitely f (%)	Probably f (%)	Possibly f (%)	Probably not f (%)	Definitely not f (%)	
Do you think PBQs can improve skills for gathering information?	19 (63.3)	7 (23.3)	2 (6.7)	2 (6.7)	0 (0.0)	4.43±0.90
Do you think PBQs will help undergraduates to organize and elaborate their knowledge?	23 (76.7)	6 (20.0)	1 (3.3)	0 (0.0)	0 (0.0)	4.73±0.52
Do you think facing more PBQs in exams will help undergraduates to sharpen their preparation?	18 (60.0)	7 (23.3)	5 (16.7)	0 (0.0)	0 (0.0)	4.43±0.77

Surveyed responses from the Anatomy teachers of Bangladesh regarding their 'experience on constructing PBQs'

Table 5 deals with the responses of Anatomy teachers regarding “their experience in constructing PBQs”. In terms of exposing undergraduates to PBQs as an interactive session in their classes, 34.5% and 24.1% teachers responded “Definitely” and “Probably” respectively. About 57% teachers thought that MBBS assessment papers “Definitely” should have more PBQs and

23.3% of them marked it as “Probably”. “PBQs are more comprehensible than traditional ones” was marked “Definitely” by 40% teachers. Almost all the teachers (96.7%) thought that “Definitely” teachers should be trained appropriately for more efficient construction of PBQs. The resulting scores of these responses varied between 3.52±1.43 and 4.97 ± 0.18.

Original Article

Table 5 Survey-based feedback from the Anatomy teachers of Bangladesh regarding their “Experience on constructing PBQs”

Questionnaire regarding problem-based question (PBQ)	Response of Anatomy teacher					Mean [±] SD
	Definitely f (%)	Probably f (%)	Possibly f (%)	Probably not f (%)	Definitely not f (%)	
Did you expose your undergraduates to PBQs as interactive sessions in your classes? †	10 (34.5)	7 (24.1)	3 (10.3)	6 (20.7)	3 (10.3)	3.52±1.43
Do you think MBBS assessment papers should have more PBQs?	17 (56.7)	7 (23.3)	3 (10.0)	3 (10.0)	0 (0.0)	4.27±1.01
Do you think teachers should be trained appropriately for more efficient construction of PBQs?	29 (96.7)	1 (3.3)	0 (0.0)	0 (0.0)	0 (0.0)	4.97±0.18
Do you think PBQs are more comprehensible than the traditional one?	12 (40.0)	8 (26.7)	6 (20.0)	4 (13.3)	0 (0.0)	3.93±1.08

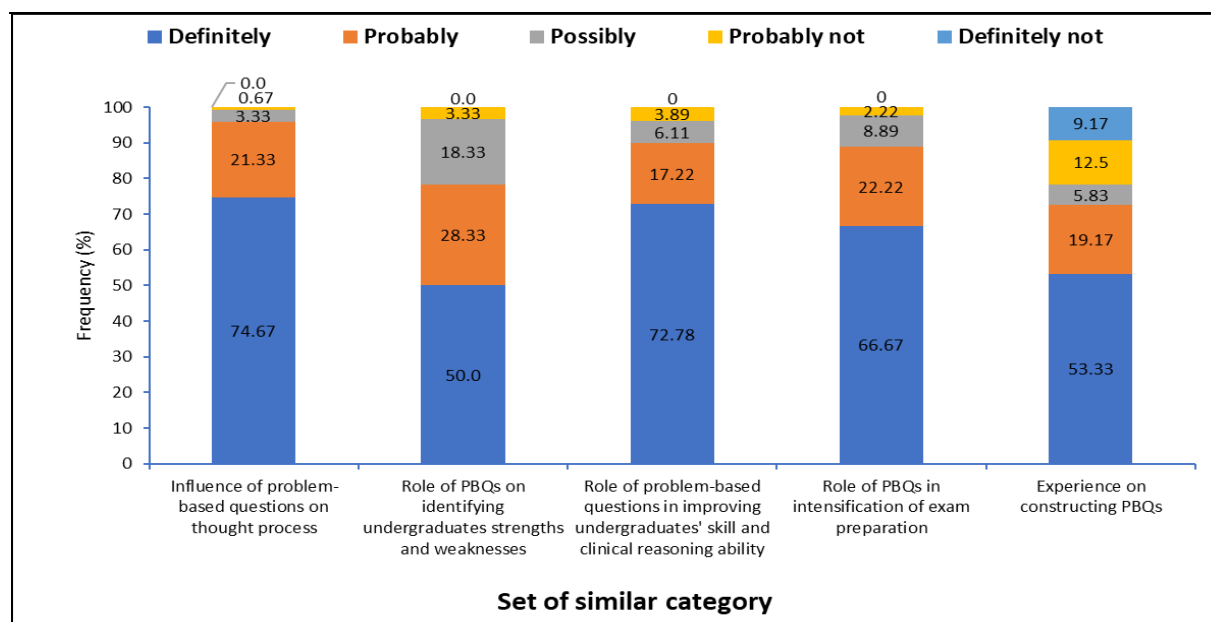


Fig. 1 Status of the problem-based questions as opined by the Anatomy teachers of Bangladesh based on a set of similar categories.

Discussion

This research aimed to analyze the perceptions, views and experiences of Anatomy teachers of Bangladesh regarding problem-based questions. Overall, the responses from the teachers to a questionnaire constructed by the researcher were in favour of a combined opinion that, for improvement of undergraduates' attitude towards a better learning process incorporation of problem-based questions can play a pivotal role.

A study conducted in India stated that inclusion of clinical cases in assessment has a great impact on undergraduates' thinking process⁹. In the present study, a large number (74.67%) of Anatomy teachers mentioned that problem-based questions can “Definitely” improve undergraduates' thought process.

For almost every question regarding the 'role of PBQs in improving undergraduates' skill and clinical reasoning ability', the Anatomy teachers agreed to the fact that it is obligatory (Table 3). However, their opinion differed regarding improving communication skills, mentioning the statement as 33.3% “Definitely”, 26,7% for both “Probably” and “Possibly”. The relative difference in solving

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PBQs in assessment and solving the problem in real life, which could be influenced by many other confounding factors, might be the reason behind their scattered opinion.

Anatomy is considered to be one of the toughest subjects to memorize¹⁰. Being a major brick on the wall of a strong clinical foundation, Anatomy needs to be learnt in such a way that it exploits more clinical implications. They claimed that if the number of undergraduates is lowered, it might cause a compromised clinical skill later on. Though Cate and Durning debriefed on the suitability of assessing clinical reasoning ability for preclinical undergraduates. They claimed that the development of diagnostic intuition is often a subconscious phenomenon¹¹.

Almost all of the teachers agreed that problem-based questions would help to identify undergraduates' strengths. But in case of identifying undergraduates' weaknesses, the statement was marked “Definitely” by 43.3% teachers.

Problem-based questions in assessment play a critical role in intensifying undergraduates' examination preparations too. It is stated that learning and its subsequent implementation by undergraduates is greatly influenced by the type of questions they face in their exams¹². From the results chapter, it was seen

that almost all the Anatomy teachers thought that problem-based questions can help in the intensification of exam preparation. Practising problem-based questions in the assessment process not only induces diversified learning but also catalyzes to achieve a higher level of cognitive excellence¹³.

Regarding the exposure of problem-based questions as an interactive session in class, about 59% of the Anatomy teachers marked “Definitely”, “Probably” and “Possibly”. For efficient construction of the problem-based questions, the “necessity of training of the teachers” was marked “Definitely” by almost all (96.7%) of the Anatomy teachers.

Conclusion

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Original Article

From the above discussion, it is obvious that Anatomy teachers were concerned about the necessity of incorporating problem-based questions in teaching and assessment for the improvement of undergraduates' ideology and skills. Proper training of the teachers can bring about a change in the current teaching and assessment process in Bangladesh. A periodical quality control surveillance will be helpful for the persistence of the applied process.

Acknowledgments

This work was partially funded by BMU. We wish to extend our sincere thanks to Professor Dr. Khondker Manzare Shamim for his exceptional guidance, motivation, and deep knowledge. Their ongoing support and suggestions have significantly advanced my research.

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