

Skills and Attitudes of Students which Affect Fostering of Critical Thinking in Undergraduate Medical Students

Ahmad Muqem, Syma Arshad*, Sadaf Sajid*, Abdullah Ahmad**

Combined Military Hospital, Okara/National University of Medical Sciences (NUMS) Pakistan, *Rashid Latif Medical College, Lahore Pakistan, **Combined Military Hospital, Lahore/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To identify students' skills and attitudes which affect fostering critical thinking in undergraduate medical students.

Study Design: Modified Delphi Study.

Place and Duration of Study: University of Lahore, Lahore Pakistan, from Oct 2018 to Apr 2019.

Methodology: This study was carried out to develop consensus. Participants were selected through purposive sampling. A draft questionnaire was developed on Google Forms and sent to five experts for pilot study, construct validation and cognitive pre-testing. Wait Time, rating on the Likert Scale and Consensus criteria of 80% were defined before the start of the study. A new questionnaire was sent to participants in each round.

Results: The study enrolled 27 experts, of which only 14 participated in all the three rounds. Experts initially identified 18 factors related to students' skills and attitudes. The consensus was achieved for 14 out of the final 16 factors. Pre-medical education through Matric/FSc. rote memorization, lack of logical and rational thinking, no active participation in interactive sessions and strategic learning by students hamper fostering critical thinking. On the other hand, students from O/A level possess better critical thinking skills because they were trained to criticize and question during class activities.

Conclusion: Individual skills/attitudes of students affect fostering of critical thinking among undergraduate medical students. They should be addressed primarily in pre-medical schools for better critical thinking abilities in medical school.

Keywords: Critical Thinking, Matric/FSc, Modified Delphi study, O/A Level, Undergraduate medical students.

How to Cite This Article: Muqem A, Arshad S, Sajid S, Ahmad A. Skills and Attitudes of Students which Affect Fostering of Critical Thinking in Undergraduate Medical Students. *Pak Armed Forces Med J* 2022; 72(5): 1711-1715. DOI: <https://doi.org/10.51253/pafmj.v72i5.7196>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Critical thinking is defined as purposeful and self-regulatory thinking used to interpret, analyze and evaluate considerations required for making a judgment.¹ It is considered a problem-solving process in which the problem is identified first through five steps of Identification, Definition, Exploration, Application and Integration and later solved through six Critical Thinking Skills,² of Interpretation, Analysis, Testing, Inference, Explanation and Self-regulation. This problem-solving process, according to philosophers, is an attitude which depends on an individual's rational and reflective thinking. Psychologists, however, regard critical thinking as a skill for which cognitive development and growth are essential. Ability to question and re-think forms the basis of this process which has to be effectively used by medical students in the current complex healthcare environment.³ Clinical reasoning, correlation of symptoms and signs, interpretation of investigations, differential diagnosis, decision making etc., are all carried out simultaneously in making

management plans continuously modified as per the new findings as an iterative process. This requires good critical thinking abilities, which should be inculcated in medical students during pre-medical and undergraduate medical education.⁴

In Pakistan, teacher-centric techniques are still being followed, whereby teaching is done through lectures. Students look towards the teacher for information and are expected to be obedient during the class. An environment of questioning, reasoning, criticism, participation and group work is not provided. Self-directed learning through higher-order thinking activities of Bloom's Taxonomy and open-ended questions like why, how, what if, so what and what next etc., is not promoted. Assessment is summative based on recall of infinite facts and figures, which does not promote higher-order thinking and creativity.^{5,6} Students rely on rote memorization and cramming without comprehension to get good grades. Problem-solving and decision-making skills for effective participation are therefore not developed. Similarly, students lack inquisitiveness and the capabilities to criticize, question, and reflect.⁷ Medical students, in particular, do not develop clinical reasoning, decision-making skills, and intellectual traits for effective and safe

Correspondence: Dr Ahmad Muqem, Combined Military Hospital, Okara, Pakistan

Received: 08 Aug 2021; revision received: 05 Apr 2022; accepted: 14 Apr 2022

patient care,⁸ and a good doctor-patient relationship, leading to medical errors.^{9,10}

Fostering critical thinking among students is not the main aim of medical education in our local context. No research has been conducted locally to explore factors affecting fostering critical thinking among medical students. The study was therefore carried out to identify factors about the skills and attitudes of undergraduate medical students which influence critical thinking among them. Addressing all the factors will help medical students become more rational and logical doctors with qualities compared to 7-star doctors.

METHODOLOGY

This modified Delphi study was carried out at the University of Lahore from October 2018 to April 2019 after getting ethical approval from ASRB (ERC/05/19/04 dated 30.04.2019).

Inclusion Criteria: Doctors who had qualified Master in Health Professional Education (MHPE), Master of Science in Medical Education (MME) or Member College of Physicians and Surgeon (MCPS) in MHPE and had been teaching as medical faculty for minimum three years were included through purposive sampling.

Exclusion Criteria: Those who were currently doing MHPE / MME/MCPS were not included.

All participants were informed about the research, and informed consent was taken through email questionnaires. They were assured of the confidentiality of data and complete anonymity. After a thorough literature review developed a draft questionnaire with open-ended questions about students' skills and attitudes in Google Forms. It was shared with five experts through emails via a generated link for the pilot study, construct validation and pre-cognitive testing.

A preliminary questionnaire was constructed for use in Round-1 after necessary amendments in the light of experts' opinions and was sent to 27 participants. A wait time of four weeks, a rating of questions on 5 points Likert Scale ranging from "Not at all important" to "Extremely important", and consensus criteria of 80%,¹¹ were defined before the start of the study.¹² After repeated reminders, 19 experts responded during the pre-defined wait time. Responses from two experts were rejected due to their less experience as faculty. In the Second-Round, the questionnaire was sent to 17 experts who responded in Round-1. After repeated reminders, 15 experts responded in four

weeks. The third questionnaire was sent to 15 experts during Round-3. Out of which 14 responded. In Delphi studies, the sample size can range from 4 to 3000. However, 15-20 experts at the end of Round-3 are considered a reasonable.¹³ The methodology was depicted as a concept map (Figure).

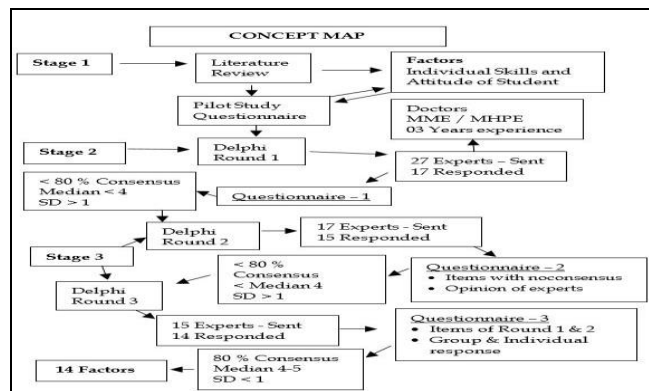


Figure: Concept Map

For each round, Social Sciences (SPSS) version 25.0 was used for data analysis (percentages, mean, median and standard deviation). The last two components of the Likert scale, i.e., Very important and extremely important, Median of 4-5 or standard deviation of less than 1, were included as consensus criteria. Items for which consensus could not be established and additional factors identified from open-ended questions of Round 01 were used to prepare a questionnaire for Round 2. It was sent to participants again for consensus development, as described earlier. A third questionnaire was prepared, which included all the items of Rounds 1 and 2 with the group response and the individual response and was sent again to the experts who participated in both rounds to ensure consistency and stability of results.

RESULTS

Questionnaires were sent to 27 experts during the first round. Out of which, 19(70.37%) experts responded. The responses of 2(7.40%) experts did not meet the inclusion criteria and were discarded. Responses from 17 experts (62.96%) were used during the research. They included male (52.94%) and female (47.06%) faculty members actively engaged in medical teaching with experience ranging from 3 to 43 years. Most (94.11%) of the experts had teaching experience of 07 years or more. Eighteen items (Individual skills and attitudes of undergraduate medical students) were identified. In the First-Round, consensus (80% or more agreement) was achieved for only five items (27.78%).

Skills and Attitudes of Students which Affect Fostering

In the Second-Round, 15(88.23%) experts out of 17 responded. The consensus was achieved for 8(66.67%) out of 12 items. In the Third-Round, 14(93.33%) out of 15 participants responded, which was considered reasonable in a Delphi study. The consensus was achieved for 14(87.5%) out of 16 items showing consistency and stability of our results, shown in Table-I. Two factors for which consensus (80% or more agreement) could be developed were shown in Table-II.

techniques are still being used, which should be transformed into a student-centric environment for higher-order learning. It further demands that the curriculum of pre-medical and medical schools should be modified and more material on analysis and evaluation be included to inculcate CT abilities in our students.^{15,16}

Rational and logical thinking plays a pivotal role in developing critical thinking skills.¹⁷ Students who verify the reliability of information and try to possess

Table-I: Individual Skills and Attitude of Undergraduate Medical Students Which Affect Fostering of Critical Thinking

1. Most of the students do not verify the reliability and validity of information
2. Most of the students do not engage actively in reflective practices to write reflections
3. Most of the students do not manage their time effectively to study and prepare for assessments
4. Most of the students are not deep and lifelong learners
5. Most of the students of Matric / FSc stream focus on rote memorization and good recall just to get good marks in examination
6. Most of the students do not participate actively in interactive discussions because they do not come to the class well prepared
7. Most of the students do not make dedicated efforts to know the real facts before making any decision
8. Most of the students do not collect adequate information to make judgment
9. Most of the students do not adequately question the assumptions before taking any decision
10. Most of the students make impulsive decisions under pressure
11. Most of the students do not try to get deeper insight and think superficially about the perspectives of patients
12. Most of the students are not well conversant with both verbal and non verbal communication
13. Poor training of students to think critically, rationally and logically in their pre medical education
14. Poor training of students to scrutinize the opinions of others before accepting them

Table-II: Individual Skills / Attitude of Students for which Consensus not developed

1. Most of the students from Urdu medium schools face difficulty to express during class discussions in English, not being their mother tongue
2. Most of the O/A Level students express and discuss better than Matric / FSc students during interactive sessions

DISCUSSION

This study's findings indicated that undergraduate medical students' skills and attitudes hamper fostering critical thinking ability. They are directly related to their improper training during pre-medical schools, especially through Matric/FSc stream. Mannan *et al.* depicted that their students focus on rote memorization without comprehension to get good marks.⁵ They do not collect adequate information and make no dedicated effort to know the real facts. Hoodhbhoy described that their students do not criticize and question the assumptions, effectively leading to a poor generation of critical thinking abilities in them.⁶ The findings of both Mannan *et al.* and Hoodhbhoy are consistent with our study. They are mainly because of the teacher-centric classroom learning environment of our premedical and medical schools. A study carried out in China showed that traditional curriculum and learning and assessment techniques affect the CT abilities of medical students. It does not inculcate CT dispositions to a great extent and fails to meet the challenges of modern healthcare systems.¹⁴ In our context, the same old curriculum and learning

deep insight into a problem have higher critical thinking abilities. However, consistent with the study by Naqi *et al.* their findings revealed that most undergraduate medical students, especially those of the Matric/FSc stream, do not think rationally and logically during their pre-medical schools.¹⁸ They are assessed through questions which mostly fall in the lower-order domain of thinking. Problem-oriented assignments and discussions are not promoted. Teachers rely on learning restricted to the cognitive domain, while students also are strategic learners. They do not want to be lifelong learners but focus only on getting good marks. Critical Thinking abilities are, therefore, not developed to the desired extent in them.

On the contrary, most students from O/A level schools possess better critical thinking abilities due to the focus of these schools on frank discussion, critical analysis and creativity during class. In addition, these schools conduct faculty development programmes to change the mindset and to teach the style,¹⁹ of faculty through structured training and focus more on problem-based higher-order assignments.²⁰ Furthermore, they ensure that their faculty acts as a facilitator

and gives constructive feedback to students.^{20,21} Their students thus possess superior critical thinking abilities.

Critical thinking abilities are refined if students participate in interactive activities and reflective practices.²² Similarly, communication skills and role-play enhance fostering of critical thinking abilities in students.²³ This participation and discussion become easy if it is in the native language, especially the mother tongue and students also possess background knowledge about the subject. This study reveals that most of our undergraduate medical students do not possess good verbal and nonverbal communication knowledge. They do not come to the class well-prepared and lack the requisite knowledge to participate in interactive discussions. They also do not engage in reflective practices because they focus merely on passing the examination instead of becoming deep and lifelong learners. Summative assessments included in the medical curriculum further add to this strategic approach. Attainment of critical thinking attitude is therefore compromised. The teaching style and assessment techniques of formative assessment have to be developed to change the strategic mindset of students to deep and lifelong learning by asking questions ranging from closed-ended, lower-order cognitive domain to open-ended, high-order analytic and evaluative questions.

According to a study by Rear,²⁴ students face difficulty expressing themselves during the interactive class session if the discussion is not in their mother tongue/local language. In our medical schools, the medium of instruction is English which is not our local language or mother tongue. It was thus implied that students of Matric/FSc schools where teaching is done mainly in Urdu would not express and participate in interactive sessions compared to O/A level students from English medium schools. This study, however, revealed in contrast to the expected belief and study by D Rear. Language is not a barrier to class discussion and interaction in medical school. Students of Matric and FSc stream from Urdu medium schools express their views effectively and participate equally in interactive sessions during their medical studies.

This study identified several factors about our students' individual skills/attitudes which hamper fostering critical thinking in undergraduate medical schools. Therefore, it is imperative to address these deficits on priority and develop strategies to improve the critical thinking dispositions of our undergraduate medical students. These strategies not only pertain to

medical institutions but to learning in pre-medical schools as well. By modifying the traditional curriculum, assessment techniques and mindset of faculty, undergraduate medical students' individual skills and attitudes can be improved to foster critical thinking. As a result, it will positively impact all the institutions, both pre-medical and medical, of our country. Consequently, doctors with good clinical reasoning, decision-making skills and intellectual traits will be produced to improve and provide advanced health care to patients.

LIMITATIONS OF STUDY

Apart from the skills and attitudes of undergraduate medical students, there are other factors like faculty, curriculum and role of regulatory bodies etc., which influence fostering of critical thinking among undergraduate medical students. They were not discussed and can be considered limitations of the study. The current study only focused on the faculty of medical education departments' opinions. Faculty perspectives from other departments and students were not considered, which might be included in future research. The modified Delphi technique was used to develop consensus. However, it is time-consuming and lacks debate and discussion. It is considered a preferred technique because it includes participants from vast geographical areas and avoids unnecessary dominance of one or more individuals. Formal interviews of participants may provide better opinions and results.

CONCLUSION

Individual skills/attitudes of students hamper fostering of critical thinking in undergraduate medical students, which should be addressed not only in medical institutions but in pre-medical schools as well.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

AM: Study design, data analysis, critical review, drafting the manuscript, critical review, approval of the final version to be published, SA: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

SS: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published, AA: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. van der Hoeven D, Truong TTL, Holland JN 3rd, Quock RL. Assessment of Critical Thinking in a First-Year Dental Curriculum. *Med Sci Educ* 2020; 30(1): 367-374. doi: 10.1007/s40670-020-00914-3.

Skills and Attitudes of Students which Affect Fostering

2. Persky AM, Medina MS, Castleberry AN. Developing Critical Thinking Skills in Pharmacy Students. *Am J Pharm Educ* 2019; 83(2): 7033. doi: 10.5688/ajpe7033.
3. Kabeel AR, Eisa SA. The Correlation of Critical Thinking Disposition and Approaches to Learning among Baccalaureate Nursing Students. *J Educ Pract* 2016; 7(32): 91-103.
4. Kasalaei A, Amini M, Nabeiei P, Bazrafkan L, Mousavinezhad H. Barriers of Critical Thinking in Medical Students' Curriculum from the Viewpoint of Medical Education Experts: A Qualitative Study. *J Adv Med Educ Prof* 2020; 8(2): 72-82. doi: 10.30476/jamp.2020.83053.1080.
5. Manan SA, Mehmood T. Culture and Critical Thinking in Classroom: Narratives from University Students in Pakistan. *Asia Pac J Soc Sci* 2015; 1(3): 110-134.
6. Hoodbhoy P. Pakistan's higher education system—What went wrong and how to fix it. *Pak Dev Rev* 2009; 48(4): 581-594.
7. Woldt JL, Nenad MW. Reflective writing in dental education to improve critical thinking and learning: A systematic review. *J Dent Educ* 2021; 85(6): 778-785. doi: 10.1002/jdd.12561.
8. Majumder MA, Sa B, Alateeq FA, Rahman S. Teaching and assessing critical thinking and clinical reasoning skills in medical education. In *Handbook of Research on Critical Thinking and Teacher Education Pedagogy*. IGI Global; 2019.
9. Royce CS, Hayes MM, Schwartzstein RM. Teaching critical thinking: a case for instruction in cognitive biases to reduce diagnostic errors and improve patient safety. *Acad Med* 2019; 94(2): 187-194. doi: 10.1097/ACM.0000000000002518.
10. Ab Latif R, Dahlan A, Mulud ZA. The Delphi technique as a method to obtain consensus in health care education research. *Educ Med J* 2017; 9(3): 89-102. doi: 10.21315/eimj2017.9.3.10.
11. Parker TA, Guiton G, Jones MD. Choosing Entrustable Professional Activities for Neonatology: a Delphi study. *J Perinatol* 2017; 37(12): 1335-1340. doi: 10.1038/jp.2017.144.
12. Diamond IR, Grant RC, Feldman BM, Pencharz PB, Ling SC. Defining consensus: A Systematic Review Recommends Methodologic Criteria for Reporting of Delphi Studies. *J Clin Epidemiol* 2014; 67(4): 401-409. doi: 10.1016/j.jclinepi.2013.12.002.
13. Ludwig B. Predicting the future: Have you considered using the Delphi methodology? *J Ext* 1997; 35(5): 5TOT2.
14. Campbell SM, Cantrill JA. Consensus methods in prescribing research. *J Clin Pharm Ther* 2001; 26(1): 5-14.
15. Huang L, Fan AP, Su N, Thai J, Kosik RO, Zhao X. Chinese medical students' disposition for critical thinking: a mixed methods exploration. *BMC Med Educ* 2021; 21(1): 385. doi: 10.1186/s12909-021-02801-w.
16. Bećirović S, Hodžić F, Čeljo AB. Critical thinking development in the milieu of high school education. *Eur J Contem Educ* 2019; 8(3): 469-482. doi: 10.13187/ejced.2019.3.469.
17. Gul R, Cassum S, Ahmad A, Khan S, Saeed T. Enhancement of critical thinking in curriculum design and delivery: A randomized controlled trial for educators. *Procedia Soc Behav Sci* 2010; 2(2): 3219-3225. doi:10.1016/j.sbspro.2010.03.491.
18. Naqi SA. Peer assisted learning as a formal instructional tool. *J Coll Physicians Surg Pak* 2014; 24(3): 169-172.
19. As'ari AR, Mahmudi A, Nuerlaelah E. Our Prospective Mathematic Teachers Are Not Critical Thinkers Yet. *J Math Educ* 2017; 8(2): 145-156. doi:10.22342/jme.8.2.3961.145-156.
20. Saeed T, Khan S, Ahmed A, Gul R, Cassum S, Parpio Y. Development of students' critical thinking: the educators' ability to use questioning skills in the baccalaureate programmes in nursing in Pakistan. *J Pak Med Assoc* 2012; 62(3): 200.
21. Dehghanzadeh S, Jafaraghaee F. Comparing the effects of traditional lecture and flipped classroom on nursing students' critical thinking disposition: A quasi-experimental study. *Nurse Educ Today* 2018; 71(1): 151-156. doi: 10.1016/j.nedt.2018.09.027.
22. Zhang C, Fan H, Xia J, Guo H. The effects of reflective training on the disposition of critical thinking for nursing students in China: A controlled trial. *Asian Nurs Res (Korean Soc Nurs Sci)* 2017; 11(3): 194-200. doi: 10.1016/j.anr.2017.07.002.
23. Rashid S, Qaisar S. Development of attitude through critical thinking. *Pak J Educ* 2017; 34(1): 35-53.
24. Rear D. The language deficit: a comparison of the critical thinking skills of Asian students in first and second language contexts. *Asian J Second Foreign Lang Educ* 2017; 2(1): 13-15.