



Development and Validation of Student Engagement Questionnaire

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ABSTRACT

Introduction: Medical students drop out rate in Pakistan is very high. In our country, only 84% of students graduate, which is significantly lower than the average for developing nations. Class engagement, has been identified as a solution to the failures, dropouts and motivational lacking of students. Being multifaceted construct, the problems of defining engagement have also led to inconsistencies in measurements too. Most of the previous student engagement questionnaires had lack of information regarding their reliability and validity, transparency and auditability. They were long and complex to understand and only measures the behavioral and social engagement. So there is a need to develop questionnaires that is short, freely available and can easily be understood by all stakeholders involved in teaching and learning.

Aims & Objectives: To develop a questionnaire to assess the engagement of undergraduate medical students during classroom activities.

Place and Duration of Study: This was mixed method study, conducted at the University College of Medicine and Dentistry, University of Lahore between November 2022 & May 2023 under the guidelines of AMEE Guide 87.

Material & Methods: After receiving consent, the first draft of the questionnaire was distributed to 14 clinical and basic science subject experts, as well as medical educators, for qualitative and content validation. To determine the response process and to address any misunderstandings regarding the significance of questionnaire items, cognitive interviews with six students were conducted. Responses from 210 undergraduate medical and dentistry students were used to gauge reliability. SPSS version 23 was used to evaluate the questionnaires, a p-value of ≤ 0.05 was considered significant. For the scale, an internal consistency of between 0.50 and 0.70 according to Cronbach's alpha was deemed sufficient.

Results: There were 14 experts who gave qualitative expert validation. The initial student engagement questionnaire contained 49 items to measure 5 theoretical constructs, and were modified to make them more comprehensible and applicable. The questionnaire's overall scale validity index was 0.84. After the cognitive interviews, there were just twenty items left. Content validation was finished in two rounds with 20 final items, yielding acceptable values of SI-CVI 0.83 & CCA 2.8. After the questionnaire had undergone pilot testing, 210 students filled it out, and the reliability of the survey was evaluated using Cronbach's alpha, which came out to be 0.721.

Conclusion: Medical colleges can use this valid and reliable student engagement questionnaire to assess students' emotional, behavioral, and cognitive involvement in class.

Keywords: Student Engagement, Questionnaire, Cognitive engagement, Behavioral engagement, Undergraduate medical students.

INTRODUCTION

Dropout rate of medical students in Pakistan is 16%, compared to USA, Australia and in New Zealand, only 84% of Pakistani medical students graduate, which is significantly lower than the average for developing countries¹. The authors point

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out that student engagement is a complex concept with many different facets². Since motivated and engaged students are more likely to participate in academic and institutional activities, they contend that engagement is an important component in fostering academic achievement and lowering dropout rates³. The definition and assessment of student engagement have not been agreed upon in the literature, according to the authors⁴. They contend that although university attendance is obligatory, a sense of responsibility and motivation towards learning cannot be commanded, a standard instrument for gauging student engagement in the classroom is lacking. The previously created engagement measures are either ambiguous regarding the engagement aspects they are examining, too long, or neither of those⁵. As a

result, all stakeholders involved in teaching and learning need a questionnaire that is simple to understand and apply⁶.

The goal of this study was to create a brief, easily understood, and publicly accessible questionnaire that gauges undergraduate medical students' cognitive, behavioral, and emotional participation in the classroom. The following research questions are addressed in this study based on subject experts (Expert validation): Q1: Which questions in the student engagement questionnaire should be used to gauge undergraduate students' participation in classroom and clinical activities? Q2: What are the questionnaire's content validity? Q3: How do students infer the survey's items (validity of the response process)? Q4: How reliable is the questionnaire?

MATERIAL AND METHODS

It was a mixed method study⁷, conducted at the University College of Medicine and Dentistry, University of Lahore from November 2022 till May 2023 after receiving approval from "Ethical Review Board" under Reference: ERC/07/23/01.

Phase 1: Development of questionnaire, Study participants, materials and methods: In this phase, answering our first question, we conducted extensive literature review and two focus groups discussions, separately with students and teachers having 6 participants in each group⁸. Transcripts of the focus group discussion were transcribed by a qualitative software called ATLAS.ti and analyzed for the themes and subthemes⁸. Items were revised and refined by the authors and questionnaire version 1 was developed. Phases of the study are shown in Fig-1 below.

Phase 2: Expert validation, Study participants, materials and methods: Out of 14 basic and clinical science experts with additional degree of medical education were invited using purposive sampling⁹ to rank the items for grammatical errors, duplication, clarity and content relevance, all of them (100%) participated.

Likert scales were included in the questionnaire to gauge the items' relevance and clarity. We utilized a scale for relevance, with 4 denoting a lack of relevance and 1 denoting a high level of relevance. We used the following scale for clarity: 3 for highly clear, 2 for item that need modification, and 1 for unclear.

Data Analysis: The content validity index (CVI) for the quantitative component was calculated for each individual item (I-CVI) and for the scale (S-CVI) based on the expert ratings¹⁰.

The percentage of experts who concurred across all items was used to determine the I-CVI, and the average of all CVI values across all items was used to calculate the S-CVI. While relevance ratings of 3 or 4 were recoded as 1, item rankings of 1 or 2 were changed to 0. The 1s for each item were added up and divided by the total number of experts to produce the I-CVI.

Using a 3-point Likert scale, the average content clarity was found to improve the clarity of the items. Each item's average clarity was calculated by adding up all of the values assigned to it, then dividing that amount by the number of items. To be considered highly clear, a clarity of 2.4 (80%) or greater was required¹⁰. Based on the comments, the items were modified, grammatical errors were corrected and version 2 of the questionnaire having 29 items was developed.

Phase 3: Demonstrating the validity of questionnaire, Study participants, materials and methods: Cognitive interviews with six students (four from 4th year MBBS and two from 2nd year BDS) were conducted to demonstrate response process. 'Think aloud' and 'verbal probing' approaches were combined. The participants were instructed to read the item aloud after reading it silently to the group¹¹. Following the participant's reading of an item, we used scripted and unscripted questions in verbal probing. The cognitive interview took place for about 50 minutes. Another researcher was also present during the session in order to strengthen the validity of the interview technique and minimize bias.

Data analysis: After considering the comments, interpretations, suggestions and ideas of the students, we came up with third version of questionnaire (having 25 items). We made the decision to have version 3's items' relevance and clarity verified by experts¹².

Content validity of the questionnaire version 3 was established again. A request to give feedback on relevance and clarity was sent again via google forms to 14 experts who submitted feedback in Phase 2 earlier. Out of 14 participants, 10 (80%) responded. The filled google forms sent by all participants were complete and included in the study.

Phase 4: Demonstrating the reliability of the questionnaire, Study participants, materials and methods: Based on reports from the literature that an acceptable sample size (minimum of 10 participants each item) was 210 students (2nd & 4th year MBBS, 2nd year BDS) for 20 items¹³. A 5-point Likert scale was used to grade the responses: 1 denoting strongly disagree, 2 denoting somewhat

disagree, 3 denoting neither agree nor disagree, 4 denoting somewhat agree, and 5 denoting strongly agree. The items were mixed up so that none could be categorized according to the proposed structures. Data analysis: Internal consistency was evaluated using Cronbach's Alpha¹⁴ SPSS version 23 was used to evaluate the questionnaires. For the scale, an internal consistency of between 0.50 and 0.70 according to Cronbach's alpha was deemed sufficient¹⁴.



Fig-1: Phases of the study showing development & validation of student engagement questionnaire.

RESULTS

Phase 1: Development of the questionnaires

We developed 29 items through literature review and 20 items through 2 FGDs. Version 1 has a total of 5 constructs and 49 items.

Phase 2: Expert validation

The first version of the questionnaire received expert feedback, which led to the deletion of 17 of the 49 items because they were duplicates, the modification of 18 items because of poor grammar, formatting, and understandability, and the addition of 1 new item. The subsequent version has 29 elements and three constructs, as indicated in Table-1.

	Expert feedback	Response process validity	Content Validity	
Student Engagement Questionnaire	Version 1	Version 2	Version 3	Final Questionnaire
Total Items	49	29	25	20
Items Accepted Without Change	10	13	17	-
Items Accepted After Modification	18	11	3	-
Items Deleted	17	1	5	-
New Items Added	1	-	-	-
Final Items	29	25	20	-

Table-1: Modifications done in different versions of student engagement questionnaire.

Phase 3: Demonstrating the validity of the questionnaire

Content validity index and content clarity average of the student questionnaire

Out of 49 items in 1st version, 17 had a CVI of less than .70, 18 had a CVI of 0.70 to 0.79, 10 had a CVI more than 0.79 so they were eliminated, modified and kept accordingly. In third version, the five items had a CVI of less than 0.70, so deleted, three had a CVI of 0.70 to 0.79, so modified and 17 had a CVI more than 0.79 and kept. Final version had 20 items with a SCVI of 0.83.

Out of 25 items in the third edition, 9 had 100% content clarity, 11 had a CCA between 2.75 and 2.93, and 5 had a CCA between 2.56 and 2.68. The scale's mean clarity was 2.84.

Cognitive interviews were used to determine the questionnaire's response process validity. 13 items didn't need to be changed because there were no ambiguities, however 11 items did need to be changed, and one item was removed.

Phase 4: Demonstrating the reliability of the questionnaire

The final questionnaire with 20 items measuring 3 constructs along with the Cronbach’s alpha rating as shown in Table-2.

Final Version-Student engagement questionnaire with Cronbach’s alpha if deleted(CAID)		
S.No.	Questions	CAID
1	I try to associate my new learnings in class to the things and experiences I already know	.720
2	While studying , I try to relate my learnings to real life scenarios	.718
3	As I study, I attempt to put together various bits of knowledge from other classes on the same topic in a new way.	.722
4	I create my own illustrations and mnemonics to aid in my understanding of the crucial ideas I discover in class.	.697
5	If I have trouble understanding a topic, I go over it again until I understand it	.713
6	I feel happy when I enter my class to attend a lecture	.702
7	I'm interested in what I'm studying in class.	.704
8	Sometimes, I feel overburdened by my studies	.722
9	I share my course problems with teachers whenever get an opportunity or feel the need	.708
10	I feel benefited from my teachers during lectures, SGDs and clinical teaching sessions	.715
11	I take help of my peers whenever needed	.712
12	I tutor my juniors whenever they come to me for help.	.702
13	I dress properly to follow discipline of the college	.715
14	I pay full attention in the class	.705
15	I make eye contact with the teacher in class	.709
16	I ask questions during lectures and all other teaching sessions	.710
17	I contribute in class discussion by giving my opinions regarding the topic of discussion	.699
18	I volunteer to participate in college curricular activities	.707
19	I discuss my grades or assignments with my teachers on monthly basis	.712
20	I feel good while working for any assigned task as a team member	.711

Table-2: Student engagement questionnaire with Cronbach’s alpha if deleted

DISCUSSION

The study's primary goal was to create a valid and reliable questionnaire that can assess student engagement. This questionnaire will be used by all stakeholders involved in learning and teaching,

including teachers, students, institutional administrators, policymakers, and curriculum specialists, to gather accurate data on where students' engagement levels in the classroom may need improvement.¹⁵

The majority of the self-reporting questionnaires created between 2006 and 2020 were designed to gauge participants' level of cognitive and behavioral engagement⁶. The cognitive component is covered by the Situational Cognitive Engagement Questionnaire (SCEQ)¹⁶, the Survey of Student Engagement¹⁷, and the Student Engagement Instrument, or SEI¹⁸. To gauge the behavioral elements, the Student Engagement Scale (SES)¹⁹ and Student Self-Report of Engagement (SSRE)²⁰ were established. According to previous studies, there was a paucity of information regarding their validity, dependability, and auditability⁶.

Few were lengthy, difficult to comprehend, and expensive, including the Higher Education Student Engagement Scale (HESES)²¹, AUSSE²², which caused student bias because students could not comprehend it properly¹⁵ and many items lacked theoretical justification and had no predictive validity⁶. In many of the measures, the context of the engagement, for example university or classroom remained unspecified²³.

This instrument's content validation demonstrates its dependability and internal consistency is comparable with alpha values from earlier research on engagement.⁶

Our study's thorough approach to generating the questionnaires in accordance with the procedures and criteria described in the literature was one of its key strengths. Cronbach's alpha analysis of internal consistency revealed a high level of internal consistency for the entire scale of 0.721¹³.

The study had a few drawbacks. We recruited people at a ratio of 1:10, which is thought to be adequate to good for the sample size¹⁴. Construct validity of the tool is lacking.

CONCLUSION

This study has produced a valid, reliable, user-friendly, brief student engagement questionnaire that is free to the public domain and can be used to gauge undergraduate medical students' participation in the classroom.

REFERENCES

1. Enabulele O, Enabulele JE. Pre-service medical education course completion and drop-out rates. Hum Resour Health [Internet]. 2022;20(1):1–7. Available from: <https://doi.org/10.1186/s12960-022->

- 00785-2
2. Bowden JLH, Tickle L, Naumann K. The four pillars of tertiary student engagement and success: a holistic measurement approach. *Stud High Educ* [Internet]. 2021;46(6):1207–24. Available from: <https://doi.org/10.1080/03075079.2019.1672647>
 3. Groccia JE. What Is Student Engagement? *New Dir Teach Learn*. 2018;2018(154):11–20.
 4. Wang M Te, Hofkens TL. Beyond Classroom Academics: A School-Wide and Multi-Contextual Perspective on Student Engagement in School. *Adolesc Res Rev*. 2020;5(4):419–33.
 5. Wong ZY, Liem GAD. Student Engagement: Current State of the Construct, Conceptual Refinement, and Future Research Directions. Vol. 34, *Educational Psychology Review*. Educational Psychology Review; 2022. 107–138 p.
 6. Kassab SE, El-Sayed W, Hamdy H. Student engagement in undergraduate medical education: A scoping review. *Med Educ*. 2022;56(7):703–15.
 7. Hong QN, Pluye P, Fàbregues S, Bartlett G, Boardman F, Cargo M, et al. Improving the content validity of the mixed methods appraisal tool: a modified e-Delphi study. *J Clin Epidemiol*. 2019;111:49-59.e1.
 8. Hennink MM, Kaiser BN, Weber MB. What Influences Saturation? Estimating Sample Sizes in Focus Group Research. *Qual Health Res*. 2019;29(10):1483–96.
 9. Dutra BD, Nascimento KC do, Echevarría-Guanilo ME, Sparapani V de C, Lanzoni GM de M. Validation of an educational game about first aid for schoolchildren. *Rev Bras Enferm*. 2021;74(6):e20201107.
 10. Yusoff MSB. ABC of Content Validation and Content Validity Index Calculation. *Educ Med J*. 2019;11(2):49–54.
 11. Meadows K. Cognitive Interviewing Methodologies. *Clin Nurs Res*. 2021;30(4):375–9.
 12. Ricci L, Lanfranchi JB, Lemetayer F, Rotonda C, Guillemin F, Coste J, et al. Qualitative Methods Used to Generate Questionnaire Items: A Systematic Review. *Qual Health Res*. 2019;29(1):149–56.
 13. Taber KS. The Use of Cronbach’s Alpha When Developing and Reporting Research Instruments in Science Education. *Res Sci Educ*. 2018;48(6):1273–96.
 14. Amirrudin M, Nasution K, Supahar S. Effect of Variability on Cronbach Alpha Reliability in Research Practice. *J Mat Stat dan Komputasi*. 2020;17(2):223–30.
 15. Kassab SE, Taylor D, Hamdy H. Student engagement in health professions education: AMEE Guide No. 152. *Med Teach* [Internet]. 2022;0(0):1–17. Available from: <https://doi.org/10.1080/0142159X.2022.2137018>
 16. Rotgans JI, Schmidt HG, Rajalingam P, Hao JWY, Canning CA, Ferenczi MA, et al. How cognitive engagement fluctuates during a team-based learning session and how it predicts academic achievement. *Adv Heal Sci Educ*. 2018;23(2):339–51.
 17. Hopper MK, Kaiser AN. Engagement and higher order skill proficiency of students completing a medical physiology course in three diverse learning environments. *Adv Physiol Educ*. 2018;42(3):429–38.
 18. Appleton JJ, Christenson SL, Kim D, Reschly AL. Measuring cognitive and psychological engagement: Validation of the Student Engagement Instrument. *J Sch Psychol*. 2006;44(5):427–45.
 19. Yu JH, Chae SJ, Chung YS. Do basic psychological needs affect student engagement in medical school? *Korean J Med Educ*. 2018;30(3):237–41.
 20. Smeby SS, Lillebo B, Slørdahl TS, Berntsen EM. Express Team-Based Learning (eTBL): A Time-Efficient TBL Approach in Neuroradiology. *Acad Radiol*. 2020;27(2):284–90.
 21. Zhoc KCH, Webster BJ, King RB, Li JCH, Chung TSH. Higher Education Student Engagement Scale (HESES): Development and Psychometric Evidence. *Res High Educ* [Internet]. 2019;60(2):219–44. Available from: <https://doi.org/10.1007/s11162-018-9510-6>
 22. Reeve J, Coates HB. Student Engagement Questionnaire. 2011;1–6. Available from: http://www.acer.edu.au/documents/aussereports/AU_SSE_2011_SEQ.pdf
 23. Sinatra GM, Heddy BC, Lombardi D. The Challenges of Defining and Measuring Student Engagement in Science. *Educ Psychol*. 2015;50(1).

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