

**ORIGINAL ARTICLE**DOI: <https://doi.org/10.3329/mediscope.v11i2.76380>**Analysis of First Professional Written Short-Answer Questions of Four Public Universities of Bangladesh in Regional Anatomy*****F Yasmin¹, SB Wahid², MA Zaman³****Abstract**

Background: Analysis of written question papers may reveal the assessment pattern and teaching- learning method of the undergraduate curriculum. Written examination is the most essential assessment tool in the MBBS curriculum and the subjective knowledge of the undergraduates' can be well assessed by the written assessment. Therefore, analyses of written question papers may reveal the assessment pattern and teaching learning method of undergraduate curriculum. The present study has assessed the weightage given to the different components of cognitive domain in SAQs in the First Professional MBBS Examination in Regional Anatomy under four public universities of Bangladesh. **Objective:** To determine the frequencies of question-segments addressing different levels of cognitive domain in the First Professional MBBS written examination in Regional Anatomy of five years (2014-2018) of four public universities of Bangladesh. **Methods:** This descriptive type of research was conducted in the Department of Anatomy, BSMMU, Dhaka. Anatomy written short-answer questions (SAQs) both paper I and paper II from 2014 to 2018 of four public universities of Bangladesh were analyzed to determine the frequency of 'question-segment's addressing different levels of cognitive domain according to undergraduate medical curriculum. **Results:** On analysis it was found that 91.42% 'question-segments' were remember-level and 8.58% were understand-level. No 'question-segment' was found that have addressed apply-, analyze-, evaluate- or create-levels of cognitive domain. **Conclusion:** The research revealed that higher levels of cognitive domain was not addressed properly in the undergraduate written question papers, so, goals of undergraduate curriculum were poorly achieved.

Keywords: SAQs, Levels of cognitive domain, Regional Anatomy.

Introduction

Written examination is a fundamental part of assessment process in the undergraduate medical education. Moreover, it is an efficient evaluation format that not only can prove students' ability to recollect the knowledge of book work, but also can achieve higher-orders of cognitive function, such as explanation of data and problem resolving potentiality.¹

Assessment of learning has always been so demanding, but an essential part of our education system.² It is an important aspect of education because it assesses learners' competency, accelerate future learning patterns and represents the quality of institutes' educational process. Assessment acts as one of the most robust drivers of innovation and reorganization in education, which defines. the goals for both learners' and teachers'.³ Therefore, the

methods of assessment should be focused on course objective, mostly at the newest phases of undergraduate education which assess multiple aspects of performance of the students.⁴ Assessment can be formative (guiding future learning, providing reassurance, promoting reflection & shaping values) or summative (making an overall judgment about competence, fitness to practice or qualification for advancement to higher levels of responsibility.⁵ The assessment instruments should be valid, reliable, and acceptable,⁶ moreover it is important to know what it is that is to be assessed as a matter of fact.⁷ Clear objectives are important in planning of the assessment and content of the assessment needs to be in line with the course objectives.

Student spends most of the time to prepare themselves for assessment as it acts as major inspirational force

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for learning that will lead them to be an efficient person for professional life.⁸ There is a greater variety of assessment practices being used in now a days in undergraduate medical education in Bangladesh compared with previous medical education in order to make the assessment more objective, reliable, valid and practicable.⁸ Therefore, written examination plays a major role in assessing the knowledge level, cognition, skill performances and attitude of students^{9,10} and it can be applied to a wide variety of assessment objectives for the purpose of measuring knowledge and application of knowledge. Written examination is an useful evaluation format that not only can assess students' ability to recall facts, but also can assess higher-orders of cognitive function, such as interpretation of data and problem solving skills.¹ Written assessment is the most essential determining factor in the MBBS curriculum and new curriculum gives emphasis on written examination to be customized, like short answer questions (SAQ) are preferred for assessment tool.⁸ Therefore, First Professional MBBS Anatomy written question paper analyses may determine the status of implementation of the curricular directive written questions in assessing the different components of cognitive domain. Curriculum for undergraduate medical education in Bangladesh has implemented both SAQ and MCQ (Multiple Choice Question) as written assessment tools from 2002. The curriculum has recommended while SAQ setting for First Professional MBBS Examination, 60% questions for recall (remember-level), 30% for comprehension (understand-level) and 10% for apply (application-level) types of question.¹¹ Though SAQ is an important assessment tool in undergraduate medical curriculum, Akhter and Sayeed analyzed the SAQ question papers (from 2009 to 2014), they found that 76.58% and 23.42% SAQs were remember-level and understand-level respectively, but they could not find application-level question.¹² As per curriculum, application-level question should be incorporated during written assessment, but that was not being followed. On the other hand, assessment tools in recent years are changing rapidly and becoming more structured and valid. Analyses of the assessment instruments is a good way of developing an insight of what and how students are learning a particular subject. Therefore, analyses of question papers, is an effective way to identify the question patterns; whether they are following the curriculum and how different levels of cognitive domain are addressing. Therefore, such research can motivate teachers in improving their way of teaching, like in

Anatomy, and is improving the standard of written question papers, as in the First Professional MBBS Examinations of different Universities of Bangladesh.

Materials and methods

Operational definitions:

1. Question paper:

For this research, First Professional MBBS Paper- I and Paper- II Anatomy written question papers (SAQs) of four public universities of Bangladesh held in last five years (2014-2018) were analyzed. Thus, each paper (I or II) was called a question paper.

a) 'Question'

The term 'question' was used to denote each numbered Short Answer Questions (SAQs) asked in the question papers.

b) 'Question-part'

This term was used to denote each separate sentence in each numbered question. Thus, a 'question' consisted of one or more 'part'(s).

c) 'Question-segment'

This term indicated each component of a 'part' of an SAQ that called for a separate answer. It should be kept in mind that each question-segment was considered as an SAQ.

2. Levels of cognitive domain addressed:

The levels of cognitive domain have been identified in Bloom's taxonomy of educational objectives and revised by Krathwohl.¹³ Bloom's taxonomy was followed in determining the levels of cognitive domain addressed in a particular 'segment' of a question while analyzing the question papers in the present research.

a. Remember-level

This term was used for a question-segment that addresses the undergraduates' ability to recall or remembering of previously learned material/ idea/ concept.¹⁴

b. Understand-level

This term was used for a question-segment that addresses the undergraduates' ability to determine the meaning of material/idea/concept.¹⁴

c. Apply-level

This term corresponds to problem-based question used in this research and the term was used for a question-segment that addresses the undergraduates' ability to use learned facts, concepts, principles and the theories in concrete situation.¹⁴

d. Analyze-level

This term was used for a question-segment that addresses the undergraduates' ability to break down a body of data or a complex concept/problem into component parts and establish the relationship.¹⁴

e. Evaluate-level

This term was used for a question-segment that addresses the undergraduates' ability to judge the reliability, utility, and merit of principles, procedures and methods on the basis of established criteria.¹⁴

f. Create-level

This term was used for a question-segment that addresses the undergraduates' ability to assemble parts into a unified body or construction of new idea/concept.¹⁴

3. Methods used for the analyses of the question papers:

For the analyses of the undergraduate written questions, all the available Anatomy Short Answer Question (SAQ) papers both Paper- I and Paper- II of the First Professional MBBS Examinations of four public universities of Bangladesh (University of Dhaka, University of Rajshahi, University of Chittagong and Shahjalal University of science and Technology, Sylhet) held in last five years were targeted. Usually, two First Professional MBBS Examinations were held in every year in January and July but, in 2015 and 2016 four Professional Examinations were held in January, May, July and November due to overlapping of old and new curriculum. After that from 2017 again two First Professional Examinations were held in May and November as per new curriculum. Each undergraduate question paper has SAQ (Short Answer Question) part and MCQ (Multiple Choice Question) part. Only SAQ part was selected and analyzed in this research. Total 99 SAQ papers (both Paper- I & II) were collected to be analyzed. However, two SAQ papers from Rajshahi University (Paper- I & II from July, 2016), seven SAQ papers from Chittagong University (paper- I & II from July, 2017; Paper- I & II from January, 2017; Paper- I & II from July, 2015; paper-I from January, 2015) and four SAQ papers from Shahjalal University of Science and Technology, Sylhet (Paper- I & II from May, 2015; Paper- I & II from November, 2015) could not be collected.

There were fourteen (14) SAQs in each Anatomy written question paper. Thus, a total of 1386 questions were selected on Regional Anatomy. Questions from Histology, Developmental Anatomy and CNS & Eyeball were excluded in this research. There were 962 questions detected from total 1386 questions. Each question had one or more 'question-part's. Each 'question-part' again had one or more 'question-segment's. Thus, a total 2197 Regional Anatomy 'question-part's were found. Therefore, a total 3089 'question-segment's in Regional Anatomy were analyzed. The mean percentage frequency of the 'question-segment's addressing different levels of

cognitive domain, were calculated.

Results

The written Regional Anatomy question papers (99 SAQs) of the First Professional MBBS Examination of four public universities of Bangladesh (from January 2014 to November, 2018) were analyzed and there was a definite predominance of 'question-segment's that were suitable to assess the medical undergraduates' ability to recall factual information (remember-level of cognitive domain) rather than their understanding (understand-level of cognitive domain) or their ability to apply the knowledge in a given situation (apply-level of cognitive domain) or to analyze (analyze-level of cognitive domain) or the ability to make judgments (evaluate-level of cognitive domain) or synthesize or construct of new idea (create-level of cognitive domain).

Table 01. Shows that a vast majority of the 'question-segment's (for SAQ on Regional Anatomy only) addressed the remember-level and some of them addressed understand-level of cognitive domain. None of the 'question-segment's were found to address the apply, analyze, evaluate and create- levels of cognitive domain in any Anatomy question papers of the four public universities any Anatomy question papers of the four public universities.

Table 01: Percentages of the 'question-segment's in Regional Anatomy of four public universities of Bangladesh addressing different levels of cognitive domain of the medical undergraduates.

Cognitive domain addressed	University-wise percentage				Mean percentage \pm SD
	DU n = 721	RU n = 884	CU n = 555	SU n = 929	
Remember-level	84.46	95.92	86.30	99.03	91.42 \pm 7.13
Understand-level	15.39	4.07	13.69	1.18	8.58 \pm 7.01
Apply-level	0.00	0.00	0.00	0.00	0.00 \pm 0.00
Analyze-level	0.00	0.00	0.00	0.00	0.00 \pm 0.00
Evaluate-level	0.00	0.00	0.00	0.00	0.00 \pm 0.00
Create-level	0.00	0.00	0.00	0.00	0.00 \pm 0.00

n, Number of 'question-segments' that have dealt with Regional Anatomy in all the available question papers of each university

DU, Results of all 28 SAQ question papers of Dhaka University (from 2014 to 2018)

RU, Results of all 26 SAQ question papers of Rajshahi University (from 2014 to 2018)

CU, Results of all 21 SAQ question papers of Chittagong University (from 2014 to 2018)

SU, Results of all 24 SAQ question papers of Shahjalal University (from 2014 to 2018).

Figure 01 shows the differences between the proportions of the Regional Anatomy 'question-segments' addressing different levels of cognitive domain of the four public universities of Bangladesh and the recommendation of the MBBS curriculum (2012) regarding it. The figure also shows the absence of 'question-segments' addressing the higher levels of cognitive domain (apply-level).

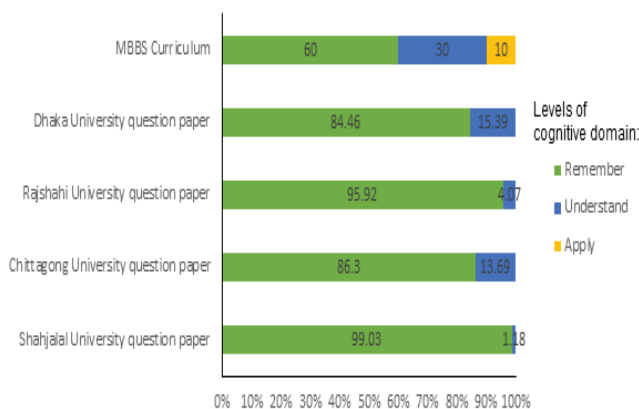


Figure 01: Proportions of 'question-segments' addressing different levels of the cognitive domain in the question papers of the last five years (2014 to 2018) compare to the proportions as dictated in the MBBS curriculum (2012) of Bangladesh.

Discussion

The present research was designed to determine the current circumstances of teaching-learning pattern and assessment method of Anatomy in the undergraduate medical curriculum by analyzing the First Professional MBBS written Regional Anatomy question (SAQ) papers. This research was carried out to incorporate newer teaching learning and assessment methods in Anatomy. Therefore, different levels of cognitive domain observed from the analyses of Regional Anatomy portion of the written question (SAQ) papers of the First Professional MBBS Examination of four

public universities of Bangladesh from 2014 to 2018.

Question analyses revealed that mean percentage of 'question-segments' addressing the remember-level and understand-levels of cognitive domain were 91.42% and 8.58% respectively in the four public universities of Bangladesh. But none of the 'question-segments' have addressed apply-, analyze-, evaluate- or create-levels of cognitive domain in any of these universities. So, it can be said that written questions in the First Professional Examination could not fulfill the demands of the curricular levels of cognitive domain. A similar study was done at BSMMU in which First Professional Regional Anatomy portion of Anatomy written question papers (only SAQ) were analyzed from 2012 to 2016, of four public universities of Bangladesh and result revealed that, the mean percentage frequencies of 'question-segments' regarding remember-level and understand-levels were 89.62% and 10.64% respectively but there was no 'question-segments' addressing apply-level of cognitive domain.¹⁵ Findings of that research are almost similar to the findings of the present research, where percentage of remember-level 'question-segments' carried most of the weightage of the question papers than the other levels of cognitive domain. But in present research, percentage of remember-level of 'question-segments' were higher than the previous¹⁵ study. In the present research, question papers analyses revealed that, all the four public universities of Bangladesh nearly fulfilled the curricular directive allocation of percentage of marks for remember and understand levels of questions. Furthermore, among the universities, university of Rajshahi and Shahjalal University of Science and Technology, Sylhet fulfilled most of the 'question-segments' addressing remember-levels of cognitive domain which was 95.92% and 99.03% respectively and which was greater than the university of Dhaka (84.46%) and university of Chittagong (86.30%). Also, a very few 'question-segments' addressed understand-level of cognitive domain in all four public universities (Dhaka: 15.39%; Rajshahi: 4.07%; Chittagong: 13.69% and Sylhet: 1.18%), which could not fulfill the curriculum directed format. Another shortcoming was that, no 'question-segments' were found to address the apply-levels of cognitive domain. So, present research findings may indicate that in our country, undergraduate written assessment method is mostly organized to assess the factual knowledge of the undergraduates but could not assess the higher levels of cognitive domain.

Akhter and Sayeed conducted a study in which they

analyzed First Professional Anatomy written question papers (only SAQ), both paper I and paper II, from January 2009 to July 2014 of University of Dhaka only.¹² The study revealed that from 2009 to 2014 First Professional MBBS Anatomy written questions that have addressed remember-level and understand-levels of cognitive domain were 76.58% and 23.42% respectively.¹² In addition, they did not identify any questions that can assess apply-level of cognitive domain. Moreover, in the present research, analyses of First Professional MBBS Anatomy question papers (I & II) of university of Dhaka, from 2014 to 2018 revealed 84.46% and 15.39% Anatomy 'question-segments' have addressed remember-level and understand-levels of cognitive domain respectively. Comparing the previous study with the present research it can be concluded that, weightage of the remember-level of 'question-segments' were increased whereas weightage of the understand-level of 'question-segments' were decreased in last five years. In addition, apply-levels of 'question-segments' could not be found in either research. So, in the last ten years, the curriculum directed format was not followed properly in the First Professional MBBS Examinations of the University of Dhaka.

Cognitive domain deals with how a student can acquire and utilize knowledge and focuses on intellectual skills.¹⁶ Therefore, it should be reflected on the assessment methods of our undergraduate professional Examinations. Furthermore, an assessment culture aims at assessing the acquisition of higher-order thinking processes and competencies instead of factual knowledge and low-level of cognitive skills.¹⁷ Therefore, higher-levels of cognitive domain like apply, analyze, evaluate and create levels should be included in the assessment method. Sumya conducted a study at BSMMU in which she analyzed Embryology portion of the First Professional written Anatomy question papers (SAQ) of four public universities of Bangladesh from 2012 to 2016; she concluded that 'question-segments' addressing the remember-levels and understand-levels of cognitive domain were 89.26% and 10.74% respectively in case of four public universities; but she could not find any 'question-segment' that addressed the apply-level of cognitive domain.¹⁸ Akter analyzed the Neuroanatomy portion of the First Professional written Anatomy question papers (both SAQ & MCQ) from 2005 to 2009; she found that the 'question-segments' which addressed the remember-level and understand-levels of cognitive domain were 97.64% and 2.36% respectively in case of four public universities. She

could not identify any apply-level of 'question-segments'.¹⁹ Therefore, it may be suggested that First Professional Anatomy written question papers could assess only lower-levels of cognitive domain; whether it is Regional Anatomy, Embryology or Neuroanatomy.

Another study was done between two groups of first year medical students regarding Neuroanatomy questions, in which higher scores were achieved on remember-type examination questions than on problem solving-type examination questions.²⁰ The author suggested that remember group did better because students captured more efficiently remember-types of information, so that they can easily recall those answers than problem-solving answers. So, for improving higher level of thinking process of the undergraduates, teaching-learning-assessment method should change as well as emphasis should be given during construction of SAQs that need to address higher levels of cognitive domain. Moreover, the learning domains can be incorporated, while designing the course outcomes of all the courses in a program that may achieve the goal of Bloom's taxonomy which is to motivate educators to focus on the learning domains and creating a more integrated form of education.¹⁶

Conclusion

Results of the present research revealed that higher levels of cognitive domain were not addressed properly in the first professional MBBS written examination in Regional Anatomy under four public universities of Bangladesh. Therefore, question setters should give more emphasis during construction of SAQ and curriculum should be followed properly. Thus, goal of undergraduate curriculum can be achieved by the written assessment.

References

1. Gosh A, Mandal A, Das N, Tripathi SK, Biswas A, Bera T. Students' performances in written and viva-voce components of final summative pharmacology examination in MBBS curriculum: A critical insight. *Indian Journal of Pharmacology*. 2012; 44 (2): 274-275. doi:10.4103/0253-7613.93870
2. Patel B, Kubavat A, Piparva K. Correlation of student's performance in theory and practical of final summative Pharmacology Examination in M.B.B.S curriculum: a critical insight. *National Journal of Physiology, Pharmacy & Pharmacology*. 2013; 3 (2): 171-175, doi: 10.5455/njppp.2013.3.33

3. Shittu LAJ, Zachariah MP, Izegbu MC, Adesanya OA, Ashiru OA. The differential impact of various assessment parameters on the medical students' performance in the Professional Anatomy Examination in a new medical school. *International Journal of Morphology*. 2006; 24 (4): 659-664. doi: 10.4067/S0717-95022006000500023
4. Ben-David MF. The role of assessment in expanding professional horizons. *Medical Teacher*. 2000; 22 (5): 472-477. doi: 10.1080/01421590050110731
5. Epstein RM. Assessment in medical education. *The New England Journal of Medicine*. 2007; 356 (4): 387-396. doi: 10.1056/NEJMra054784
6. Holmboe ES, Sherbino J, Long DM, Swing SR, Frank JR. The role of assessment in competency-based medical education. *Medical Teacher*. 2010; 32 (8): 676-682.
7. Tabish SA. Assessment methods in medical education. *International Journal of Health Sciences*. 2008; 2 (2): 1-5.
8. Haque M, Yousuf R, Bakar SMA, Salam A. Assessment in undergraduate medical education: Bangladesh perspectives. *Bangladesh Journal of Medical Science*. 2013; 12 (4): 357-363.
9. Gopalakrishnan S, Udayshankar PM. Question vetting: the process to ensure quality in assessment of medical students. *Journal of Clinical and Diagnostic Research*. 2014; 8 (9): 1-3. doi: 10.7860/JCDR/2014/9914.4793.
10. Farooqui F, Saeed N, Araj S, Sami MA, Amir M. A comparison between written assessment methods: multiple-choice and short answer questions in end-of-clerkship examinations for final year medical students. *Cureus Journal of Medical Science*. 2018; 10 (12): 1-8. doi: 10.7759/cureus.3773
11. Curriculum of Anatomy course for undergraduate medical students of Bangladesh-Compiled and Edited by Center for Medical Education (CME). Dhaka: Bangladesh Medical and Dental council. 2002.
12. Akhter J, Sayeed S. Status of implementation of short answer question in Anatomy examination of MBBS course in Bangladesh. *Ibrahim Medical College Journal of Medical Science*. 2018; 12 (2): 1-4.
13. Krathwohl DR. A revision of Bloom's taxonomy: an overview. *Theory Pract* 2002; 41(4): 212-218.
14. Begum T, Concepts of medical education, Asian Colour Printing. 2013. Dhaka.
15. Khatun, M. Analyses of medical undergraduate written questions and undergraduates' ability to answer clinically-oriented questions compared to non-clinically-oriented questions in Regional Anatomy, masters thesis, Bangabandhu Sheikh Mujib Medical University. 2018.
16. Kasilingam G, Ramalingam M, Chinnavan E. Assessment of learning domains to improve student's learning in higher education. *Journal of Young Pharmacists*. 2014; 6 (4): 27-33. doi: 10.5530/jyp.2014.1.5.
17. Gulikers JTM, Bastiaens TJ, Kirschner PA. A five-dimensional framework for authentic assessment. *Educational Technology Research and Development*. 2004; 52 (3): 67-86.
18. Sumya, FT. Analyses of medical undergraduates' ability to answer illustration-based and clinically-oriented questions compared to non-illustration-based and non-clinically-oriented questions in Embryology, masters thesis, Bangabandhu Sheikh Mujib Medical University. 2018.
19. Akter M. Analyses of undergraduate written questions and medical undergraduates' ability to answer illustration-based and clinically oriented questions in neuroanatomy compared to non-illustration-based and non-clinically oriented questions. Thesis (MPhil). Bangabandhu Sheikh Mujib Medical University. 2010.
20. Geertsma RH & Matzke HA. Cognitive processes in learning neuroanatomy. *Journal of medical education*. 1966; 41 (7): 690-696. doi: 10.1097/00001888-196607000-00007