

## A Cognitive Level of Essay Questions and Item Writing Flaws in MBBS University Anatomy Question Papers: An Analytical Study

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### Abstract

**Background:** Assessment drives learning. Reliable and valid question papers of higher cognitive function are difficult to produce, particularly for assessment of clinical problem solving. The present study was undertaken to analyze the essay questions and item writing flaws in the summative anatomy question papers. **Methodology:** 4 years Summative assessment question papers were collected and analyzed, (16 question paper and 32 essay questions) for cognitive level and item writing flaws by two assessors separately. Essay questions were analyzed according to modified blooms taxonomy of cognitive levels and by using validated checklist items. Item writing flaws were analyzed using validated checklists. The results were analyzed using SPSS software. **Results:** Among 32 essay questions analyzed, all of them were at level 1 of cognitive level of Bloom Taxonomy. Majority of questions addressed the competency that could be assessed only with essay question, were aligned to learning outcomes, structure and pertaining to must know aspects of curriculum. Out of 32 essay questions 17.2% were of average, 51.7% were good and 31% were of excellent quality. In connection with item wise flaws, majority of questions were ambiguous 86.2%, 75.9% questions were repeated in multiple years, same areas of curriculum was addressed in 51.7% questions and there was unequal distribution of marks among different topics in 75.9% papers. **Conclusion:** Well-constructed, peer-reviewed question papers meet the educational requirements and are advocated for assessing medical students. To construct the higher level of cognitive domain the faculty has to be well trained.

**Keywords:** Essay Question; Cognitive Domain; Assessment; Item Writing Flaws.

### Background

Assessment is an essential and important component of the medical education. It provides evidence as to, how well the students learning objectives are being achieved and whether the teaching standards are being maintained [1]. Though Many traditional and innovatory assessments methods are used to assess the student learning but still written examination remains as golden standard method to assess the cognitive domain. Question paper is the tool for assessment of written

examination. Out of different type of items in the question paper, essay questions plays a major role to assess the understanding and application level of cognitive domain.

Assessment is the important factor that influences and drives student learning. Students perceive the assessment as a dominant factor to motivate and direct their learning. The method of assessment determines the approach of students towards learning. Students' are inclined to espouse a surface approach when assessment emphasis is on just recall of factual knowledge. They tend to adopt a deep approach if assessment demands higher levels of cognitive abilities [2]. Problem-solving skills are an essential component of the medical practitioner's clinical ability and as such must be taught, learned and assessed during training [3].

Framing of questions should be such that assessment become reliable and valid. The Present evaluation system assess only the recall level of cognitive domain. But as medical educators our

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responsibility is to define and provide the skills of the competent physician and to assess whether these skills are acquired or not. As Anatomy is very vast and it is the foundation stone for all clinical subjects, we should cover wider areas in subtopics for assessment. So during framing and planning for the assessment this must be kept in mind.

The present study was taken to analyze the Anatomy question paper item based on modified blooms taxonomy of cognitive level and to estimate the frequency of item writing flaws.

## Methodology

The cross sectional study was conducted at Department of Anatomy. 4 years Summative assessment question papers (University examination) were collected and analyzed, (16 question paper and 32 essay questions) for cognitive level and item writing flaws by two assessors separately. Essay questions were analyzed according to modified blooms taxonomy of cognitive levels and by using validated checklist items. Item writing flaws were analyzed using validated checklists. The results were analyzed using SPSS software.

## Modified Blooms Taxonomy

Level I: Knowledge, Level II: Comprehension and application, Level III: Problem-solving [3]. The 8 checklists for essay questions and 5 checklists for item writing flaws were prepared and validated. Validation was done by 8 experts from the members of medical education department. The validation was both from internal and external members. After validation the checklists were pilot tested.

## Statistical Analyses

Data collected was entered in MS Excel 2010 and analysed using SPSS version 22. Descriptive statistical measures like percentages were applied. The maximum score that a question paper can secure fulfilling all the components of cognitive levels is 13 and minimum score could be 0. Thus 0 to 13 is divided into four quartiles. The question paper that scores Lowest 25% that is zero to 3.25 is categorized as poor, 25 to 50% (3.26 to 6.5) is categorized average, 50 to 75% (6.6 to 9.75) is categorized as good and 75 to 100% (9.75 to 13) is categorized as excellent quality question paper.

## Results

**Table 1:** Essay question analysis

Sl. No	Checklist items	Responses in %
1	Blooms taxonomy Level	100 % from Level I
2	Could the item(Question) be better assessed with a different kind of assessment?	Yes - 27.6 No - 72.4
3	Is the essay question aligned with the intended learning outcome?	No - 22.4 Yes- 77.6
4	Is the essay question too long and should it rather be split up into several relatively short essay questions?	Yes - 24.1 No - 75.9
5	Is the question worded and structured in such a way that it will be clear to the students what they are expected to do?	Yes - 32.9 No - 67.2
6	Is the question structured / semi structured / not structured?	Structured - 67.2 Semi structured - 12.1 Not structured - 20.7
7	Is the question from must know / good to know/ nice to know areas?	Must know - 86.2 Good to know - 10.3 Nice to know - 3.4

**Table 2:** Item writing flaws

Sl. no	Checklist items	Responses in %
1	Ambiguity	86.2
2	Repetition	75.9
3	Most of the questions from the same area	51.7
4	Not equal distribution of marks in all topics	75.9
5	Lengthy paper	27.6

Among 32 essay questions analyzed, all of them were at level 1 of cognitive level of Bloom Taxonomy. Majority of questions addressed the competency that could be assessed only with essay question, were aligned to learning outcomes, structure and pertaining to must know aspects of curriculum.

Out of 32 essay questions 17.2% were of average, 51.7% were good and 31% were of excellent quality.

In connection with item wise flaws, majority of questions were ambiguous 86.2%, 75.9% questions were repeated in multiple years, same areas of curriculum was addressed in 51.7% questions and there was unequal distribution of marks among different topics in 75.9% papers.

## Discussion

Some misconceptions about written assessment may still exist, despite being disproved repeatedly by many scientific studies. Probably the most important misconception is the belief that the format of the question determines what the question actually tests [4]. Any assessment tool has a direct impact on the learning.

The Revised regulations on graduate medical education by Medical Council of India the undergraduate medical education programme is designed with a goal to create an

“Indian Medical Graduate” (IMG) possessing requisite knowledge, skills, attitudes, values and responsiveness, so that he or she may function appropriately and effectively as a physician of first contact of the community while being globally relevant [6]. Assessment of competence of problem-solving ability has been one of the most difficult areas to measure and quantify [6]. This is because it is difficult to produce a higher order cognitive skill questions [7]. The essay question is one of several tools developed to try and assess these skill. The Students usually study to pass the exams so the assessment should be designed in a relevant way [7]. Essay questions and short essay questions are generally given in the exam but lesser studied. The Essay questions allow students more flexibility in their response and reflect their individuality of approach in which interpretative skills are developed. Essay questions allows specific feedback to direct future learning [8]. Essays are ideal for assessing how well students can summarise, hypothesise, find relations, and apply known procedures to new situations. They can also provide an insight into different aspects of writing ability and the ability to process information [4].

Edward in their study on analysis of modified essay questions in the 2005 paper 51% of the questions tested factual recall (Bloom level I), 47% tested data interpretation (Bloom level II) and only 2% tested critical evaluation. The pattern was similar for the 2006 paper with 54% testing Bloom level I cognitive skills and the remainder (46%) testing Bloom level II [3].

Another study on analysis of modified essay questions showed that 39.4% of questions testing level I, 20.25 on level II and 40.4% are on level III of blooms level of cognitive domain [9]. In another study 83.33% of SEQs was at recall level while remaining 16.67% were assessing interpretation of data. But in the present study all the essay questions (100%, Table 1) were testing Bloom level I cognitive skills.

It is evident from the questions paper analysis that different subdivisions of anatomy are usually not given proper weightage in the anatomy written examinations [10]. Adequate coverage of the course content is necessary for the validity of assessment [11]. Weightage to the content areas is a delicate issue on which even the experts often differ in opinion and the weightage of various topics depended mainly on the examiners own judgment [12]. In the present study 75.9% (Table 2) of papers had unequal distribution of marks. Garg R in their study found that different subdivisions of Anatomy are usually not given proper weightage in the Anatomy written examinations and there are some aspects which are usually covered less than required [10]. Some subdivisions of Anatomy remained uncovered in some question papers. For example, questions from Genetics were found in the question papers of only four sessions out of fifteen sessions examined. There were some sessions where there was complete absence of questions from Clinical Anatomy and from some particular areas of Regional Anatomy [13].

Few studies demonstrate that some faculties are unable to frame questions and the effects of this poor examination system reflecting in students' performance [14]. It is quite understandable that conduction of a proper assessment is not only dependent on the cognitive aspect of question, but there are so many factors which play a role like, reliability, content and construction validity, financial and human resources [9]. In the present study most of the significant results like ambiguity, repetition and unequal distribution of marks in the item writing flaws could be mostly attributed to lack of awareness, commitment from the faculty, not giving importance to blue printing and insufficient training of the faculty.

## Conclusion

In the present study all the essay questions were of level I of Blooms cognitive domain. In written examinations But to produce a competent physician we need to assess the higher level like understanding and application level of cognitive domain. Though most of the essay questions were of good quality and structured but they were testing only just recall of knowledge. Lot of ambiguity, repetition and no proper weightage to all the divisions of Anatomy. Probably the flawed items are due to lack of training to the faculty. As the curriculum is moving towards competency based even the assessment should be structured in such a way that it should align with learning objectives. Faculty should be encouraged and trained to construct an essay questions for higher order of cognitive level. Through the faculty development programs these item writing flaws could be reduced to minimum.

## Key Messages

Conscious awareness would avoid item writing flaws and faculty training would mould faculty to develop higher cognitive level essay questions.

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