Item Analysis (Postvalidation) of MCQs in Anatomy for the First MBBS Course

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Abstract

Objectives: MCQs is the most commonly used method for assessing the performance of medical students. The aim of this study is to assess the quality of MCQs for creating viable question bank for future use, to identify the low achievers and their learning difficulties, faculty development and also for its use in high stake examination. *Methodology:* 150 students of First year MBBS course attended 20 MCQs in the subject of Anatomy Goa Medical College Bambolim Goa. The MCQs were best single response type with four options, each item comprising of one mark to be answered in fifty seconds for 20 marks. There was no negative marking and 50% score was considered as pass. Prevalidation of MCQs was done by senior faculties. Post validation of the MCQs was done by Item analysis for Difficulty Index, Discrimination Index and Distractor Effectiveness. *Results:* The items analyzed had Difficulty Index (p) were acceptable (50%), too easy (10%) and too difficult (10%). The Discrimination Index (d) were good (50%), excellent (30%) and acceptable (20%). Since all the items had response more than 5% and were functional distractors, the Distractor effectiveness was zero. *Conclusion:* Item analysis can tell us if an item was too easy or too difficult and how it can be discriminated between high and low achievers and also all the distractors were effective.

Keywords: MCQs; Item Analysis; Difficulty Index; Discrimination Index; Distractor Effectiveness.

Introduction

The educational spiral consists of teaching learning and evaluation. Hence by evaluation of the MCQs we can assess the quality of the items and its impact in summative, formative and also in High stake examinations.

MCQS emphasize the recall of factual information rather than conceptual understanding and interpretation of concepts [1].

Properly constructed MCQs can assess higher cognitive processing Blooms taxonomy such as interpretation, synthesis and application of knowledge instead of just testing recall of isolated facts [2,3]. The most characteristics of the evaluation process and evaluation tool are relevance, validity reliability, objectivity and feasibility [4].

MCQs comprises of only 10 percent of marks of total written examination in preclinical subjects. The post exam analysis is currently taken into consideration for the formative and summative examinations in Anatomy, Physiology and Biochemistry at Goa Medical College Goa.

MCQs are not included in Paramedical and Clinical subjects.

However the entire examination for admission to All India Postgraduate courses and DNB courses in the field of Medicine and Post graduate courses in Dentistry is by the marks scored in High Stake examination evaluated by MCQs.

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Objectives

1. To assess the quality of MCQs for creating viable question bank for future use.

2. To identify the low achievers and their learning difficulties

3. Faculty development

4. Use in High stake examination

Methodology

Study Design: Cross Sectional

150 students of First year MBBS course attended 20MCQs in the subject of Anatomy during their preliminary examination at Goa Medical College Bambolim Goa. The MCQs were best single response type with four options, each item comprising of one mark to be answered in fifty seconds for 20 marks.

There was no negative marking and 50% score was considered as pass. There was no negative marking. A group of senior faculty members were involved in prevalidation of MCQs. Post validation of the MCQs was done by Item analysis. The correct answer was referred as "Key"[5].

The papers were evaluated and students were ranked in the order of merit. These papers were arranged in descending order according to their scores. The top one third were labeled as High Achievers Group (HAG) and the lower one third were labelled as Low Achievers Group (LAG). The middle third were not considered for the study.

Prepare a table for each item as follows: Correct Key. **C**

Options	No. of students selecting option amongst HAG (H)	No. of students selecting option amongst LAG (L)	Total Response N%
A			
B			
C			
D			
Not attempted			
Total	**50**	**50**	**100**

Evaluation

Post validation for each item will be analyzed for

❖ *Difficulty Index (P)*

Percentage of students who selected the correct response. Whether the item had appropriate level of difficulty

P = H + L/N x 100

H = Number of students in HAG answered correctly

L = Number of students in LAG answered correctly

N = Total number of students

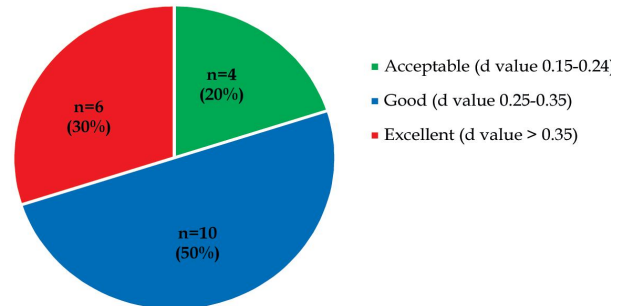*Interpretation of Difficulty Index (P): P value*

< 30	30	40	50	60	70	> 70
Too Difficult			Good			Too easy Reject
			Acceptable			

❖ *Discrimination Index (d)*

Whether the item is capable of discriminating between knowledgeable and ill-informed students
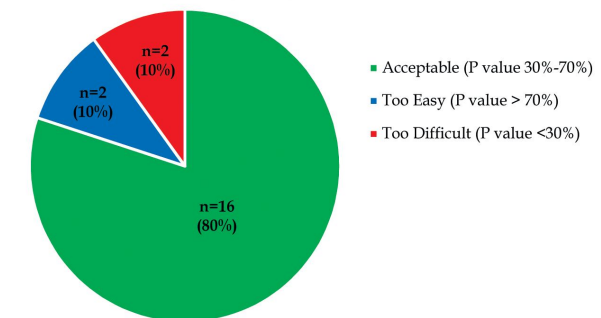
d = H – L/N x 2

Discrimination Index

Acceptable (d value 0.15-0.24)
Good (d value 0.25-0.35)
Excellent (d value > 0.35)

Interpretation of Discrimination Index (d): d value

< 0.15	0.15-0.24	0.25-0.34	> 0.35
Discard	Acceptable	Good	Excellent

Difficulty Index (P value)

Acceptable (P value 30%-70%)
Too Easy (P value > 70%)
Too Difficult (P value <30%)

❖ *Distractor Effectiveness*

Effectiveness of the option.

Any distractor attracting less than 5% of the total response is said to be non-functional. It is useful to get feedback on effectiveness/functionality of each alternative, since poor alternatives would lead to greater possibility of guessing the correct answer [6].

Feedback from Staff

Faculty development for MCQs and Item analysis

To test cognitive domain

Can be administered in a short period

Can be assessed by computer

To detect the technical flaws in item

To provide feedback to students

To provide feedback to teachers

Aids in selection of valid MCQs

Tedious

Time consuming

Hard work

Cooperative efforts

Feedback from Students

1. Chances of Guess work

2. Tests the knowledge accurately

3. Easy/ too difficult

4. Gets confused with the other options

Results

In our present study 20 items were analyzed after prevalidation of the MCQS for difficulty index, discrimination index and for distractor effectiveness.

The mean score of the difficulty index (p value) showed 80 percent of the items were within the acceptable limits (P value 30% to 70%), 10 percent were too easy (P value >70%) and 10 percent were too difficult (P value< 30%), as shown in pie diagram 1.

The mean score of discrimination index (d value) showed that 50 percent of the items were good (d value 0.25-0.35), 30 percent were excellent (d value >0.35) and 20 percent were acceptable (d value 0.15 – 0.24) as shown in pie diagram 2.

Discussion

The assessment (summative and formative) forms

an important component of evaluation in teaching learning process in addition to long assay and short assay questions. MCQs helps in assessing the students wherein the syllabus is very vast so as to rank them in high stake examination. Prevalidation of properly constructed MCQs is very tedious, time consuming, cooperative efforts not only to test the standard or quality but also levels of knowledge. The good quality of MCQs can only be possible if they are subjected to item analysis.

In various studies conducted on item analysis it has been reported that the difficulty index is 61% were in acceptable range (p 30-70%), 24% (p>70%) as too easy and 15% items were too difficult (p<30%) [7]. Studies also reported that difficulty index showing 62% items in acceptable range (p30-70%), 23% were too easy (p>70%) and 15% were too difficult (p<30%) [8].

Other studies revealed that difficulty index showed 80% of items were in acceptable range (p 30-70%) and 20% in unacceptable range (p>70% & p< 30%) whereas discrimination index (d) showed 40% items > 0.35, 42% between 0.2 -0.34 and 18% <0.20 [9]. Similarly the difficulty index of the 62% items was in acceptable range (p 30-70%), 32% (p>70%) too easy &6% too difficult (p<30%) whereas the discrimination index showed 52% items were >0.35, 18% between 0.2-0.34 and 30% items had <0.2 [10]. The negative discrimination which has been reported in 20% was probably due to wrong key, ambiguous framing of question or generalized poor preparation of the students.

In our present study the properly constructed and pre validated items the difficulty index (p) were 80% in acceptable range (p 30-70%), 10% were too easy (p>70%) and 10% were too difficult (p <30%). The discrimination index (d) in our present study reported 50% of the items were good d(0.25-0.34) & 30% were excellent d (>0.35) and 20% were in acceptable range d (0.15-.24).

A distractor is said to be functional only when it is attracted by at least 5% of the total response in the high achievers group and in the low achievers group. The non functional distractors is an indicator which provides us an opportunity to replace it by a functional distractor.

Earlier studies revealed that 52.2% were functional distractor (FD), 35.1% were nonfunctional distractors (NFD) and 10.2% were not chosen by any student [11]. Studies also revealed that 1.1 to 8.4% were FD and 38% were NFD[12], similarly 18.16% were FD and 35.33% NFD and 46.01% had nil response [10]. In our present study all were functional distractors (FD).

Conclusion

Item analysis can tell us if an item was too easy or too difficult and how it can be discriminated between high and low achievers and also all the distractors were effective.

Take Home Message

Helps in achieving better teaching, better learning and for high stake examination and also addition to the existing question bank.

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