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RESEARCH ARTICLE

ITEM ANALYSIS OF MCQS IN BIOCHEMISTRY- TO INCREASE MCQ VALIDITY.

Dr.Kanchan Sonone¹, Dr. Pooja S. K. Rai² and Dr. Pramod Ingale³.

1. Assistant Professor, Department of Biochemistry, Lokmanya Tilak Municipal Medical College & Hospital, Sion Mumbai.
2. Associate Professor, Department of Biochemistry, Lokmanya Tilak Municipal Medical College & Hospital, Sion Mumbai.
3. Professor & Head, Department of Biochemistry, Lokmanya Tilak Municipal Medical College & Hospital, Sion Mumbai.

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Key words:-

MCQ, item analysis, difficulty index, discrimination index, distractor efficiency.

Abstract

Background: Item analysis is the set of qualitative and quantitative techniques and procedures used to evaluate the characteristics of items of the test before and after the test development and construction. Multiple Choice Questions (MCQs) are a popular assessment tool due to their high objectivity, high reliability and the ability to assess a large content in a short time span.

Aims and objectives: The aim of the present study was to validate the MCQs/Item.

Material and methods: 120 MCQs in Biochemistry of the single best response type were subjected to the process of item analysis and the difficulty index, discrimination index and distracter effectiveness were calculated using standard formulae. These MCQs and distracters were then classified into groups as per standard reference ranges of these parameters and the absolute number and percentage of MCQs and distracters in each group were calculated.

Results: The percentage of MCQs that could be accepted as having desired validity based on difficulty index, discrimination index were 78(65%), 24(20%). Thus these MCQs could be used for assessment while the rest needed modification and retesting or needed to be discarded.

Conclusion: MCQ item analysis must be performed as it helps in question paper setting as per the need of assessment, it improves Teaching – Learning outcomes and is a source of great item bank.

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Introduction:-

Multiple choice questions (MCQs) /Items are frequently used to assess students in different educational streams for their objectivity and wide reach of coverage in less time. However the items to be used must be of good quality. The present study was conducted to develop a pool of valid items & to update question bank for designing question paper as per the need of assessment.

Corresponding Author: - Dr. Pooja S. K. Rai.

Address: - Associate Professor, Department of Biochemistry, Lokmanya Tilak Municipal Medical College & Hospital. Sion Mumbai.

Context and Rationale

Problem	<ul style="list-style-type: none"> • Too difficult or too easy questions lead to loss of validity of assessment. • How to write successful items that is MCQ? • How to design MCQ correctly?
So What	<ul style="list-style-type: none"> • Plan to validate the items
Impact	<ul style="list-style-type: none"> • Better questions for assessment • Validation of question bank • Better assessment and efficient IMG

Aim

To Validate the MCQs/Item

Objective:-

To find out difficulty index(p), discrimination index (d) and distractor efficiency (DE) of MCQs

Material:-

1. Study Area: Biochemistry Dept. LTMMC & LTMGH Sion ,Mumbai
2. Study Design: Mixed (Qualitative and Quantitative)
3. Study Period: 5 months ; March 2018 to August 2018
4. Sample Size: 120MCQs /Items
5. Study Tool: MCQ answer sheets
6. Ethical Approval : Taken
7. Analysis: Difficulty Index , Discriminator Index and Distractor efficiency

Methodology:-

1. Total 120 items of single best response type, from Biochemistry Internal examination of 150 1st year MBBS students, were analysed.
2. No negative marking
3. Pre-validation of the paper was done by the experts. Evaluation was done by marks and 50% score was the passing mark.
4. Post validation of the paper was done by item analysis.
5. The scores arranged in order of merit.
6. The upper one third students were considered as HIGH ACHIEVERS and lower third as LOW ACHIEVERS.
7. High achiever group (n= 40) - 1/3rd of the papers with high scores were selected
8. Low achiever group (n=40) - lower 1/3rd of the papers with low scores were selected.
9. Middle third (n=40) were set aside

Analysis Details :

Parameter	Formula	Categories and cut off	Meaning of categories
Difficulty Index (p)	$\frac{(H+L)}{T} \times 100$	Difficult : Difficulty index < 30% Medium (Acceptable) : Difficulty Index 30 – 70 % Easy : Difficulty Index > 70 %	Less than 30 % of students could answer questions correctly. Between 30 – 70 % of students could answer question correctly. > 70 % of students could answer questions correctly.
Discriminator Index (d)	$\frac{(H - L)}{T} \times 2$	Excellent : > /- 0.35 Good : 0.2 to 0.34 Acceptable: 0 to 0.2	

		Can not Discriminate : 0 Poor : 0 to - 1	
Distractor Efficiency	% of students having marked distractor as right answer	Functional Distractor : Distractor effectiveness \geq 5 % Non functional Distractor : Distractor effectiveness $<$ 5 %	At least 5% of students have marked distractor as right answer. < 5 % of students have marked distractor as right answer.
H = High achievers L = Low achievers T = Total no of students			

Evaluation Matrix For Short term outcomes

Outcome	Indicator	Data source	Data collection method
Validation of Question bank	Difficulty index, Discrimination index and distractor efficiency of all test items	MCQ answer sheets	Formative and summative MCQ exam

Results:-**TableNo 1:-Categories of Items According to Difficulty Index**

Difficulty Index (p)	Category of Items	Total no of Items (120)
$< 30\%$	Difficult	12(10%)
30 – 70 %	Acceptable	78(65%)
$> 70\%$	Easy	30(25%)

TableNo 2:-Categories of Items according to Discrimination Index

Discrimination Index (d)	Discriminative Power	Total no of Items (120)
≥ 0.35	Excellent	72(60%)
0.2 to 0.34	Good	21(17.5%)
0 to 0.2	Acceptable	24(20%)
0	Can not Discriminate	3(2.5%)
0 to - 1	Poor	0

TableNo 3:-Categories of items according to Distractor efficiency

Items with 0 Non Functional Distractor	Items with 1 Non Functional Distractor	Items with 2 Non Functional Distractor	Items with 3 Non Functional Distractor
DE = 100 %	DE = 66.66%	DE = 33.3 %	DE = 0 %
57(47.5%)	48(40%)	6(5%)	9(7.5%)
Total no of items = 120			

Discussion:-

On reviewing difficult questions, it was observed that these items were from Desirable to know or Nice to know portion of syllabus.

On reviewing easy items, it was noticed that many of them were from Must know portion of syllabus.

Difficult questions should be retained and can be used in Entrance exams.

For easy items, discrimination may be poor. This is because both, high and low achievers can answer correctly. Whether to retain such item depends on its relevance.

It was well designed question paper.

Items having NFDs were discussed with faculty experts and required modifications were discussed to update question bank.

With item analysis, teachers get an insight into how well a particular topic has been understood by the students and which topics need more emphasis.

Conclusion:-

1. Difficult questions should be discussed with students and doubts should be cleared.
2. Must know topics should be emphasized during theory lectures and should be taught in greater detail.
3. Items with negative discrimination index must be reviewed.
4. Analyzed and revised test items strengthen and update the MCQ bank.
5. It helps in question paper setting as per the need of assessment.
6. It improves Teaching – Learning outcomes.
7. A source of great item bank.

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5. In this study as the undergraduate students (1st MBBS) were exam going, we were not able to interact with students as the study was done between March to August.