ORIGINAL ARTICLE
ASSESSMENT OF NON-FUNCTIONAL DISTRACTERS IN MULTIPLE CHOICE QUESTIONS: A DESCRIPTIVE ANALYSIS

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Background: The ability of an examination to elicit cognition can be find out by systematic review of assessment scores of MCQs through item analysis. It is paramount to assess different parameters of MCQs which affect the quality of test items and eventually the standard of the assessment. Present research was focused to assess non-functional distracters of MCQs. **Methods:** Archival data of Item-analysis was used to assess the proportion of non-functioning distracters in the professional examination MCQ items attempted by undergraduate medical students. A total of 943 MCQ items were reviewed, including 4715 options (3772 distracters and 943 correct responses). Options which were opted by less than 5% of the total respondents were called as Non-Functional Distracters. **Results:** It was found that 943 MCQ items under study had 3772 distracters in total out of which 1742 (47.16%) were non-functional. It was seen that 162 items had 0, 239 had 1, 248 had 2, 169 had 3 and 125 items had 4 NFDs. **Conclusion:** High number of non-functional distracters showed that most of the options were used as fillers due to the lack of the faculty training program and less understanding of constructing MCQs. It is essential to make plausible distracters in a scientific manner rather than selecting them randomly as a filler for the questions.
Keywords: Assessment, MCQ, item analysis, non-functioning distracters

INTRODUCTION

There are several methods to assess the cognition level of the learner and to ensure the achievement of educational goals. Multiple Choice Question is one such method. Torres C, Lopes AP, Babo L and Azevedo J[1] believed that MCQs are mostly used for measuring lower level of cognition such as recall, facts, principles and methods whereas they are usually ignored for their real purpose to assess higher level of cognition such as comprehension, application and analysis. MCQ is an efficient tool for evaluation but the effectiveness of an MCQ in assessing the learner is totally dependent upon the quality of the MCQ, which can be assessed by item analysis.[2] Item analysis is a valuable, yet relatively simple procedure performed after the examination that provides information regarding the reliability and validity of a test item.[2] Item analysis is the course of utilizing examinees' responses to evaluate the quality of an MCQ.[3] The statistical values of item analysis help in defining which items are good and which items need amendment or omission.[4]

Distracters are mainly of two types i.e. functional and non-functional distracters. Distracters which are marked by less than 5% of the total respondents are called non-functional distracters (NFDs) whereas the distracters marked by more than 5% of the total examinees are called functional distractors.[5–7]

Regardless of the fact that MCQ is an important assessment tool, little work has been done till date in assessing the variables and components of MCQ items. After searching through all major databases, scarce literature has been found to the best of our knowledge that assesses the constituents of an MCQ such as scientific and evidence based synthesis of main stem, optimal number of options and optimal number of distracters.

Unfortunately, due to the lack of formal training of the faculty in constructing test items, many deficiencies have been found in this domain. Considering the gaps in faculty development program and lack of statistical evidences, the present study has been conducted which tends to give a descriptive analysis of non-functional distracters. This study will help us in educating the faculty on item analysis. The study will help us and the faculty to analyze the distracters in a more scientific manner rather than picking them randomly as fillers during MCQs synthesis. Later on, after execution of any test or examination, the results of this study will also help the assessment teems/task forces and the faculty to revise or discard implausible distracters.

MATERIAL AND METHODS

It was a cross-sectional descriptive study which involved the analysis of archival data available in the assessment centre of Department of Medical Education in University College of Medicine & Dentistry, Lahore. The study was conducted after getting formal approval from Institutional Review Board of the University. A total of 943 MCQs from undergraduate professional examinations were analysed to evaluate distracters.

Number of non-functional distracters of each item were calculated after importing all the data into excel sheet. A separate column was inserted into the sheet and every item was observed very closely to pick the distracters who were marked by less than 5% of the total respondents.

RESULTS

Nine hundred and forty-three MCQs were analysed to identify non-functional distracters. Out of total 3772 distracters, 1742 (47.16%) were non-functional. It was seen that 162 items had 0, 239 had 1, 248 had 2, 169 had 3 and 125 items had 4 NFDs as shown in Table-1.

Table-1: Post exam analysis of MCQs to identify non-functional distracters

No. of Items	No of Distracters	Items with 0 NFDs	Items with 1 NFDs	Items with 2 NFDs	Items with 3 NFDs	Items with 4 NFDs	Total No. of NFDs
943	3772	162 (17.18%)	239 (25.34%)	248 (26.30%)	169 (17.92%)	125 (13.25%)	1742

NFD: non-functional distracter

DISCUSSION

Total 943 MCQs were assessed through item analysis reports. The high percentage (47.16) of NFDs highlights that the options given in multiple choice questions were not plausible enough for the students and almost half of the distracters failed to distract the students from the correct answer. This high percentage stresses on a significant point that the faculty or educators who furbished the MCQs and their subsequent options did not have enough training to make plausible distractors[5] which led to faulty options synthesis affecting the quality of MCQs in specific and the examination in general. Lack of workshops on assessment methods and deficiency of faculty development programs are among the major causes which refrain the faculty from being equipped with the art and sciences of MCQ synthesis and understanding of item analysis statistics.[7]

Out of 943 MCQs, 650 (68.93%) had less than 2 non-functional distracters which reflects that these items were well constructed and the options were also plausible to the respondents. However, 294 (31.17%) MCQs had 3 to 4 non-functional distracters. This huge number of implausible distracters stress on the issue of optimal number of options that should be used in an MCQ. Many studies have been conducted on the optimal number of options for an MCQ in different education systems[8]. Rodriguez suggested that 3 options are optimal in any MCQ and they can perform as well as 4 options with less time required by the faculty to make them.[9]

More number of implausible options in any MCQ affect the quality of an item and also waste the time of the faculty in their synthesis.[5] Vyas R and Supe A[8] made the similar observations in their study of 'multiple choice questions: a literature review on the optimal number of options'. Haladyna TM and Downing SM suggested in their study that 2 distracters play more effective role in MCQs rather than 4 or 5 options because distracters beyond 3 options are mostly 'fillers'.[10] Studies suggest that 2 plausible distracters are preferred over 4 to 5 implausible options.[11] Hence, the key is the quality of the distracters rather than the quantity.[12]

On the other hand, it is noteworthy that there is no psychometric reason which suggests that all MCQs should have equal number of options because some questions genuinely demand more distracters as compared to the rest.[8] Therefore, it is instructed to the educators that 3 plausible options are sufficient for an MCQ but under special circumstances, they should make as much options as required by the content to be assessed.[13]

Despite the latest research supporting 3 options MCQs, major testing organizations, MCQ writing guidebooks, institutional policies and MCQ banks, mostly consider 4 to 5 options MCQs[14–16]. It is unclear why teachers and institutions are reluctant in using 3 options MCQs. It is possible that teachers might find longer MCQs to be more thorough, moreover, 3 options MCQ increases the chances of correct guessing by weaker students[13] or maybe teachers have very little role in deciding the format because of the already laid down institutional assessment policies.[16]

MCQs with 3 options benefit the teachers by saving testing time and by allowing them to make and assess more MCQs, hence increasing content validity.[17] It was found in a sample test consisting of 100 MCQs with three options that students could solve 12.4% more MCQs as compared to four options MCQs.[18] Moreover, more number of MCQs increase the overall test reliability. Reducing MCQ options from four to three in the study showed that mean score of the test was affected by only 1%.

The present study has also helped in reviewing and identifying non-functional distracters in each examination. After revising/deleting these NFDs, these MCQs can be administered in future tests in better way. Teachers should expect that almost 50% of their constructed items will fail to perform optimally as they had desired.[19] Therefore, item analysis provides empirical statistical data which can be used for item improvement. Hence, item analysis should be

incorporated in post examination analysis to uplift the standards of assessment.[5]

CONCLUSION

The present study has concluded that plausible distracters should be incorporated among the options given in multiple choice questions if we intend to achieve the benefit of MCQs as assessment method. Optimal number of options should be given to decrease the chances of distracters to be implausible.

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