Original Article

Effect of faculty training on quality of Multiple Choice Questions

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Objective: To compare the scores obtained from quality of One-Best MCQs checklist before and after the faculty training workshop.

Methodology: This Quasi-experimental single group study was conducted at Indus University of Health Sciences, Karachi, Pakistan in the year 2015-16. A faculty development workshop was conducted as an intervention on One-Best MCQ writing as per the guidelines provided by the National Board of Medical Examiners (NBME). Two sets of 65 One-Best MCQs were prepared both pre and post workshop and were reviewed by one Content Expert and 2 Medical Educationist together by using checklist as per NBME Guidelines. The data was entered in SPSS version 23 and analyzed using Wilcoxon test.

Results: The faculty training on One-Best MCQ writing lead to improvement in the quality of MCQs. There was significant decrease in mean score of flaws in One-Best MCQS from pre- test to post-test (p<0.01). The most common flaws were found in the stem and lead-in of MCQs.

Conclusion: The study emphasizes on the importance of faculty development workshops on Item writing. The positive outcome of the study shows that there is constant need to internalize the importance of faculty development program in order to conduct valid and reliable assessment in the institutes. (Rawal Med J 202;46:430-433).

Keywords: Multiple Choice Questions, item writing, faculty training.

INTRODUCTION

Assessment is a fundamental component of curriculum that motivates students to learn.[1] One - best Multiple Choice Questions (MCQs) are the most common assessment tool used to assess the cognitive knowledge of students.[2,3] A well-constructed One-Best answer question assesses higher order thinking skills as it connects the stem, clinical vignette or context to the lead-in statement and option list, and cannot be answered without understanding the connection between these.[2-4] Designing such questions, requires expertise.[4,5] Several reports show that high stakes examination did not achieve the required high quality without training of faculty members.[2,4-8]

The objective of the workshop was to impart item writing skills in participants, the in depth analysis of each One-Best MCQ by considering the stem, lead- in, and options in basic rules of writing One-Best multiple choice questions is done. This study will be helpful in demonstrating the effectiveness of faculty training programs in improving the quality of test items. The purpose of this study was to evaluate the impact of a faculty development initiative on the quality of test items that are being used in assessment.

METHODOLOGY

This quantitative quasi experimental single group study was carried out in Department of Pathology, Indus University of Health Sciences, Karachi, Pakistan in the year 2015-2016. Ethical Approval was obtained from ethical review board of College (ref no ERC202/15, dated February 21, 2015). Checklist was developed to analyze One-Best MCQs and was reviewed by one subject expert and two medical educationists for validation. Consent was taken from all faculty members.

Participating faculty members were requested to construct One-Best MCQs according to the set of given objectives. The 65 questions were submitted by the entire faculty prior to the workshop and were assessed by reviewers on structured checklist and the number of flaws in each category was labeled as pre workshop data. After obtaining the pre workshop data, a four-hour workshop was

conducted based on item writing guidelines of National Board of Medical Examiner 2003. The One-Best MCQs which were according to given objectives were included in study and One-Best MCQs that were not according to the given objectives were excluded from the study.

Statistical Analysis: All data analysis were performed using SPSS Statistics 23. Dichotomous data was entered. A score of zero (0) was given to the variables without flaws and one (1) was given to the variable with flaw. The debatable scores in both sets were reviewed and scored after the general agreement of reviewers. $p<0.05$ were considered as significant.

RESULTS
Both data sets (pre and post) were tested for reliability of checklist used. Descriptive analysis and inferential analysis was done in three categories namely stem, lead-in, and options separately. There were 17 variables in the checklist. There was significant improvement in MCQs writing after the workshop (Table 1 and 2).

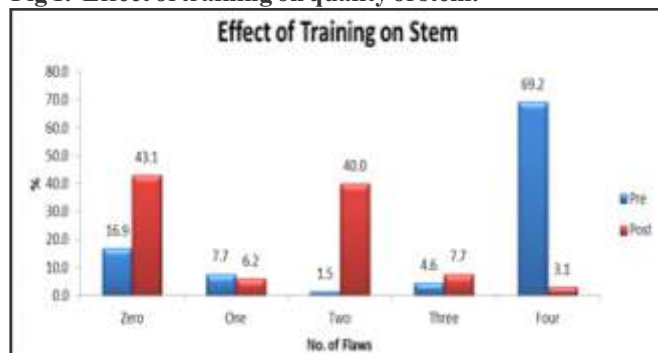**Fig 1. Effect of training on quality of stem.**
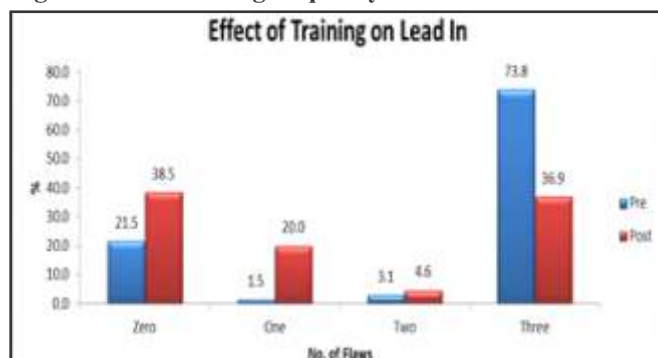

Fig 2. Effect of training on quality of lead-in.

Table 1. Frequency of item writing flaws in One-Best MCQs.

Item writing flaws	Number of One Best MCQs	
	Pre training	Post training
Stem	n	n
Ambiguous and unclear information	50	06
Absence of clinical vignette or scenario	48	33
Irrelevant amount of information	45	03
Recall questions	53	37
Lead-in		
Unfocused lead-in	50	27
Negative cover test	51	32
Not in question form	48	32
Options		
Not arranged (alphabetical/numerical order)	7	4
Different length	28	20
Non Homogenous	18	21
Absolute and vague terms	0	0
Use of none of the above/all of the above	0	0
Grammatical /logical cues	9	1
Words repeat in stem and in option(clang clues)	1	-
Use of convergence strategy	7	3
Jargons/ abbreviations in (stem/options)	14	20
Long correct answer	1	1

Table 2. Before and after training session difference.

Categories	Pre Training		Post Training		p-value
	Mean	SD	Mean	SD	
Stem	3.01	1.60	1.21	1.17	<0.01*
Lead In	2.29	1.24	1.40	1.33	<0.01*
Options	1.30	1.17	1.09	1.02	0.24
Total Flaws	6.61	2.97	3.70	2.66	<0.01*
*p<0.05 was considered significant using Wilcoxon Sum Rank Test					

Fig. 1 showed at pre training stage four flaws (maximum number of flaws possible) in stem were present in 69.2% questions and only 16.9% of stems were flawless, whereas after the training percentage of flawless stems increased to 43.1%. In pre workshop set of One-Best MCQs 73.8% questions were found with three maximum possible flaws. Moreover percentage of questions without any flaw in lead-in increased from 21.5% to 38.5% (Fig. 2).

DISCUSSION

Importance of capacity building and faculty role has been highlighted in many studies.[9] A large number of One-Best MCQs showed improved construction of stem after the training. The most frequent flaws found were: 1) ambiguous and unclear information in stem 2) absence of clinical scenario and 3) assessment of simple recall facts. This important finding of this study is similar study by Downing in which he reported that 46% of One-Best MCQs had item writing flaws and most common flaws were 'unfocused stem and ambiguous questions'.[6]

Keeping in view the common flaws in both studies, it seems that the reasons for such flaws/deficiencies could be due to inability to understand the concept of higher order thinking skills which leads to formation of recall questions without any clinical scenario. Another reason for more flaws in stem could be faculty eagerness to check students on the content taught during the teaching and learning sessions.

The high frequency of ambiguous and unclear information in both studies seems that untrained faculty members could be excellent in their academic responsibilities but they belonged to different context and have diversity in their reading and writing capabilities, which can be masked up by regular training sessions and reduce the chances of making mistakes in One-Best MCQ construction. The results of this study are in close agreement with the previous researches related to item writing and faculty training.[10,15]

While comparing the results from same institute, an analytical study was conducted and the most common flaws were associated with the structure of stem. Similar pattern of flaws was observed in the pre workshop set of MCQs in this study.[11] The results are similar to study done by Skeff et al, which showed positive effect of training on the teaching skills of basic health sciences.[12] However there is need to further explore the effect of item writing training on clinical science faculty.[13] Though, the faculty perception was not measured in this study, most of the other faculty training programs.[14]

There was a significant increase in the knowledge and skills regarding assessment after attending the workshop on six step approach for standardized student assessment.[16] Any type of regular faculty development activity either in teaching and learning or assessment play a positive role in the capacity building that improve the productivity in a medical institution.[17]

Workshops should be conducted to reinforce item writing skills. Long term impact of this learning can be assessed after three to four months or at the end of the academic year to evaluate attrition of skills if any. Based on the significant effect of one day faculty training workshop in this study, it is highly recommended to conduct interactive faculty training sessions to support and promote active participation on regular intervals in well-structured hands-on workshops.

There are several limitations of this study. After the training, faculty and their One-Best MCQs were taken only from one department, the generalizability of the study was limited. Larger studies can be done with faculty members and their One-Best MCQs of other disciplines. There was no control group. The scoring of One-Best MCQs was done by three reviewers but they were not blinded, adding to limitations of this study.

CONCLUSION

Training of faculty on item writing reduces the item writing flaws and produce better quality One-Best MCQs. Improvement in One-Best MCQ will ultimately increase the validity of exam and reinforce students to select deep learning approach. It is responsibility of educational institutes to conduct valid assessments of student performance.

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