

## Writing MCQ in A “Reverse Way”: Feasibility and Usability

Majed Mohammed Wadi<sup>1</sup>, Mohamed Nour-El-Din<sup>2</sup>, Muhammad-Ghaus Qureshi<sup>3</sup>

<sup>1</sup>Medical Education Department,

<sup>2</sup>Anatomy Department,

<sup>3</sup>Pathology Department (former faculty), College of Medicine, Qassim University, SAUDI ARABIA

To cite this article: Wadi MM, Nour-El-Din M, Qureshi M-G. Writing MCQ in a “reverse way”: feasibility and usability. *Education in Medicine Journal*. 2017;9(3):63–68. <https://doi.org/10.21315/eimj2017.9.3.7>

To link to this article: <https://doi.org/10.21315/eimj2017.9.3.7>

### ABSTRACT

**Introduction:** Well-written Multiple Choice Questions (MCQs) can assess higher level of thinking and test application of knowledge. Extensive faculty development is essential to diminish poor quality MCQs. The usual approach in writing MCQ is to select a topic, then to write a clinical scenario, then to think about the possible option list that should be included for this MCQ. Such approach can produce poor MCQs due to heterogeneity of option list. Writing MCQ from bottom (options) to top (scenario) reduces the effect of poorly selected options and improves the quality of MCQ. **Methods:** A workshop was conducted to train faculty members how to construct MCQs in this way. After the workshop, semi-structured interview was done with group of participants to ask perception of trainee was assessed to see the feasibility and usability of this approach. Participants were interesting to use this approach. **Results:** They perceived it as feasible and usable method. Using this approach will produce high quality MCQ with homogenous option. Different scenarios can be written for the same list of options. This will increase the item pool in the question bank. **Conclusion:** Writing high quality MCQ in Medicine is an art rather a science. It needs a collaborative work from a group of experts in that a particular field to construct a very good MCQ to meet the recognised criteria of MCQ writing.

**Keywords:** MCQ, Writing MCQ, Workshop, Saudi Arabia

### CORRESPONDING AUTHOR

Dr. Majed Mohammed Wadi, Assessment Unit, Medical Education Department College of Medicine, Qassim University, Saudi Arabia | Email: [majedwadi@qumed.edu.sa](mailto:majedwadi@qumed.edu.sa)

### INTRODUCTION

Multiple Choice Questions (MCQs) are the most assessment modalities that have been used extensively and worldwide. These can be used to examine a large number of students in a short time with extensive coverage of content areas. Well written MCQs can assess higher level of thinking and test application of knowledge (1, 2). Most MCQs, even those written

by experienced faculty, are still flawed in some ways (3). Therefore, extensive faculty development is essential to diminish poor quality MCQs. In such training courses, guidelines of writing MCQs are discussed and explored, and at the end, trainees are constructed MCQs. They start to spend a great deal of time to construct the stem and much less time on developing plausible options to the correct answer. They write stem then followed by options list. This can

yield good shape but not good quality of MCQ. Therefore, many MCQs fail to have effective distractors (4). High quality MCQs need the options to be well written and able to discriminate between well-informed and less-informed students. Each option should be based on a common misconception about the correct answer (5). High quality MCQs are extremely needed to continuously supply the question bank in any medical school. In particular, it is highly demanded in College of Medicine, Qassim University, Saudi Arabia, as it is the leading college to prepare and conduct Progress Test overall the kingdom (6). From this notion, this paper aims to highlight about feasibility and usability to develop MCQs in a “reverse way”; from options to stem. For this reason, a workshop was conducted to train faculty members how to construct MCQs in this way. Perception of trainee was assessed to see the feasibility and usability of this approach.

## METHODS

The workshop was designed to into two sessions, grand session, and hands-on sessions. In the grand session, all registered faculty attended in the main conference hall in the college. We started by interactive discussion about guidelines of writing MCQs, common flaws of MCQs, and characteristics of good distractors (options). Then, we discussed a diverse way to write MCQs, start from options to stem. In such way, a special form was presented (refer Appendix A) (7). It begins with theme, subtheme, and options list. Then, there is a space to write stems. Trainers were requested to think about one theme, for example, Bacteriology, and then subtheme, such as virulence factors, and list down all possible virulence factors such as pilli, flagella, capsule, peptidoglycan, lipopolysaccharide ... etc. From such list, trainers identify one virulence factor and write a proper case scenario that is related to it. For example, if plasmid was selected, then the case will be like this: **Culture and**

**sensitivity testing of a swab from a skin wound, revealed *Staphylococcus aureus*, which was resistant to penicillin. Which of the following is responsible for mediating the resistance?**

The last step is to select the homogenous options from that particular list, including the correct option. This can give good MCQ with good distractors.

In the hands-on session, participants were divided into different small groups based on their time schedule that is suitable for them. In each session, participants were requested to construct three MCQs based on the given form. At the end, all participants presents their works and reflected to each other the flaws in MCQs if are there. After completing the workshop, semi-structured interview was done with group of participants (10 participants) to assess their perception about such approach to write MCQ and discuss with them the feasibility to apply this approach when they write MCQ. We used three questions: (a) What is your opinion about this approach in writing MCQ? (b) Do think is it feasible? (c) Is there any difficulties you face during such approach?

## RESULTS

Participants shared their perceptions at the end of the workshop (during semi-structured interview). All participants gave a positive response. They reflected that such way in writing MCQ (from list to stem) is very practical and generate a lot of very credential MCQs. Some of them stated that “I attended a lot of workshops on writing, MCQ, however, this is the first workshop which is very effective from me”. Another said, “At the beginning of the workshop, I was disagree with this approach to write MCQ, but at the end, I felt it is very good as I have a challenge to write options without such form”. Almost all of them said that they can write different MCQ using the same options list but with different scenario per each item.

About feasibility of such method, they agree that it is generally feasible, however, certain MCQ, which are needed to assess factual knowledge particularly for basic phase, should be written in a direct manner (without scenario).

Regarding the difficulties, which might be faced during construction of MCQ by this approach, they did not report any difficulty.

## DISCUSSION

Writing high quality MCQ in medicine is not easy job, particularly, when MCQ will be used for high stakes exams e.g. national licensing exam or "Progress Test". MCQ for such exams should be of a very high quality and meet the international standards. For this reason, a lot of time and effort are consumed to craft high quality MCQ (8). However, almost all constructed MCQ even from high expertise persons contain some flaws (3). For this reason, a review committee is playing a crucial role in crafting high quality MCQ (8, 9).

Selecting the area (or the topic) of MCQ, in which it will cover, depends on "blueprinting". This blueprint should match in competencies and the intended learning outcomes of the curriculum (10).

The usual approach in writing MCQ is to select a topic, then to write a clinical scenario, then to think about the possible option list that should be included for this MCQ (11). Such approach produces a poor MCQ. This is because that item writer thinks about the stem and consumes a lot of time to construct it and make it in a real context; however, the option list in this case seems to be flawed. It may contain a heterogeneous options or sometimes very odd options that can be easily excluded by low-level students. Such MCQ may harm the good students who spend a lot of time to think about all options. Good students

are usually deep thinkers; hence, this type of MCQ can easily mislead them. To minimise such thing, the approach of writing MCQ should be reconsider. Writing MCQ from bottom (options) to top (scenario) reduces the effect of poorly selected options and improve the quality of MCQ by making it more discriminating. This workshop aimed to train faculty to use this approach and assess their perception about it. Results of workshop evaluation showed that such approach is doable and feasible. Faculty members reflected their interest to use this approach. Based on this approach, from the selected five homogenous options, they can produce five different items using the same option list but different scenarios. MCQ that will be used for high stakes should be very high quality and able to discriminate between students. This approach helps to apply this notion. Faculty development should be continuously done to reach this mission and to maintain such quality (12). This will increase the pool of MCQ in item bank.

There are some limitations from this work. It needs further evaluation to assess the practical effect of this approach through comparison of item analysis before and after using this approach. Moreover, students' perception should be evaluated to see if there is a difference before and after applying this approach. This is calling for future research to apply experimental study to assess the practicality of this approach.

## CONCLUSION

Writing high quality MCQ in medicine is an art rather a science. It needs a collaborative work from a group of experts in that a particular field to construct a very good MCQ to meet the recognised criteria of MCQ writing. Faculty development should be continuously done to reach this mission and to maintain such quality.

## APPENDIX A

### MCQ Preparation Form

For initial preparation of MCQ of the single best answer

- **Choose a theme** (*e.g. fatigue, antibiotics, enzymes, diet, digestion, etc.*)

---

---

Theme: ----- Sub-theme: -----

---

---

- **Make a list of 6 to 10 options (the provisional option list). These will later form the branches of the question. They must be homologues** (*e.g. all diagnoses, antibiotics, blood gas values ... etc.*) and each should be short (*normally one or two words*)

**Provisional option list:**

**More than 5 are needed – the list must be short and homologues**


- **Now select ONE of the provisional option and make it with an asterisk (\*)**
- **Write vignette that suits the selected, to form the question stem. This should normally be between one and five sentences in length**

Question stem
---------------

---

**Lead-in question:**

---

---

---

**Options:**

---

**a)**

---

**b)**

---

**c)**

---

**d)**

---

**e)**

---

- **Next, look at other options in the provisional list and cross out any that also suit the selected option well.**
  
- **Finally, reduce the option list to 5, containing the selected option plus 4 others. The chosen option MUST be an indisputably better answer than the other 4 (although the other 4 do not have to be totally incorrect).**
  
- **You are now ready to move on the second stage of item-writing!**

## REFERENCES

1. Downing SM. Written tests: constructed-response and selected-response formats. Assessment in health professions education. New York: Routledge; 2009.
2. Haladyna TM. Developing and validating multiple-choice test items. London and New York: Routledge; 2012.
3. Baranowski RA. Item editing and editorial review. Handbook of test development. New Jersey: Lawrence Erlbaum Associates Publishers; 2006.
4. Tarrant M, Ware J, Mohammed AM. An assessment of functioning and non-functioning distractors in multiple-choice questions: a descriptive analysis. BMC Medical Education. 2009;9:40.
5. Haladyna TM, Downing SM. How many options is enough for a multiple-choice test item? Educational and Psychological Measurement. 1993;53(4):999–1010.
6. Al-Shobaili H, Saleh MN-E, AlGhasham A, Saqr M. Report of the first multi-institutional progress test in Saudi Arabia. AMEE Conference. Prague Congress Centre, Prague, Czech Republic. 2013 [cited 2017 May] Available from: <https://amee.org/getattachment/Conferences/AMEE-Past-Conferences/AMEE-Conference-2013/AMEE-2013-ABSTRACT-BOOK-updated-190813.pdf>.
7. Department of Medical Education. Resources pack for item writer of one-best MCQs. Pakistan: College of Physician and Surgeons Pakistan; 2000.
8. Wadi MM. Question vetting: theory and practice. Education in Medicine Journal. 2012; 4(1):1–4.
9. Wallach PM, Crespo LM, Holtzman KZ, Galbraith RM, Swanson DB. Use of a committee review process to improve the quality of course examinations. Advances in Health Sciences Education. 2006;11(1):61–8.
10. Hamdy H. Blueprinting for the assessment of health care professionals. The Clinical Teacher. 2006;3(3):175–9.
11. Case SM, Swanson DB. Constructing written test questions for basic and clinical sciences, (Revised) 3rd ed. Philadelphia: National Board of Medical Examiners; 1998.
12. Naeem N, van der Vleuten C, Alfaris EA. Faculty development on item writing substantially improves item quality. Advances in Health Sciences Education. 2012;17(3):369–76.