



Comparison between Two Assessment Methods; Modified Essay Questions and Multiple Choice Questions

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ABSTRACT

Aims Using the best assessment methods is an important factor in educational development of health students. Modified essay questions and multiple choice questions are two prevalent methods of assessing the students. The aim of this study was to compare two methods of modified essay questions and multiple choice questions in occupational health engineering and work laws courses.

Materials & Methods This semi-experimental study was performed during 2013 to 2014 on occupational health students of Mashhad University of Medical Sciences. The class of occupational health and work laws course in 2013 was considered as group A and the class of 2014 as group B. Each group had 50 students. The group A students were assessed by modified essay questions method and the group B by multiple choice questions method. Data were analyzed in SPSS 16 software by paired T test and odd's ratio.

Findings The mean grade of occupational health and work laws course was 18.68 ± 0.91 in group A (modified essay questions) and was 18.78 ± 0.86 in group B (multiple choice questions) which was not significantly different ($t = -0.41$; $p = 0.684$). The mean grade of chemical chapter ($p < 0.001$) in occupational health engineering and harmful work law ($p < 0.001$) and other ($p = 0.015$) chapters in work laws were significantly different between two groups.

Conclusion Modified essay questions and multiple choice questions methods have nearly the same student assessing value for the occupational health engineering and work laws course.

Keywords Examination Questions; Occupational health; Legislation as Topic

CITATION LINKS

[1] A model for programmatic assessment fit for purpose [2] The effects of evidence based medical education on learning of first aids [3] Exploring assessment factors contributing to students' study strategies: Literature review [4] Top five flashpoints in the assessment of teaching effectiveness [5] The relationship between medical students' learning approaches and performance on a summative high-stakes clinical performance examination [6] Evaluation of Modified Essay Questions (MEQ) and Multiple Choice Questions (MCQ) as a tool for Assessing the Cognitive Skills of Undergraduate Medical Students [7] The modified essay question: Its exit from the exit examination? [8] Assessment of higher order cognitive skills in undergraduate education: Modified essay or multiple choice questions? [9] Comprehensive undergraduate medical assessments improve prediction of clinical performance [10] The effects of educational planning on learning of occupational health students [11] Comparing the influence of three educational methods on the epidemiology of occupational diseases' learning qualities [12] Tips for developing a valid and reliable bank of multiple choice questions (MCQs) [13] The educational impact of assessment: A comparison of DOPS and MCQs [14] Does student confidence on multiple-choice question assessments provide useful information? [15] Local development of MCQ tests for evidence-based medicine and clinical decision making can be successful [16] Comparing a script concordance examination to a multiple-choice examination on a core internal medicine clerkship [17] Validity of MCQ tests [18] Comparison of the effect of post-instruction multiple-choice and short-answer tests on delayed retention learning [19] Integrating students' reflection-in-learning and examination performance as a method for providing educational feedback [20] Modified essay question (MEQ) paper: Perestroika [21] Computer-based testing of the modified essay question: The Singapore experience

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Introduction

Assessment methods of students are important in medical sciences because courses have different aims and objectives [1-3] and teachers were always recommended to use proper and suitable assessment methods [4, 5]. According to scientific studies, multiple choice questions are the most popular assessment methods but must be designed properly [6, 7]. Essay writing is used in recent years as an assessment method but medical sciences professors changed the essays structure and these modified essay questions are preferred, but not suitable for all subjects [8, 9].

Occupational health and work laws had some general and some specific chapters. In occupational health these chapters were definitions, physical, chemicals, biological, ergonomic factors and safety. In work laws these chapters were work laws as a general, Tamin laws, younger work laws, women work laws, harmful works laws and others [10, 11].

Sadaf *et al.* have studied the validity and reliability of the multiple choice questions (MCQs) method [12]. Cobb *et al.* have talked about the educational impact of assessments such as Direct Observation of Procedural Skills (DOPS) and MCQs [13]. The confidence of MCQs was debated in some other studies. Crites *et al.* have shown that the development of MCQs tests for evidence-based medicine and clinical decision making can be successful which means that MCQs are useful for new educational methods. The importance of proper design of exams, especially MCQs, has been shown in other studies [14-17].

Ramraje & Sable have compared the effect of post-instruction multiple-choice and short-answer tests on delayed retention learning [18]. Feedbacks giving to students after exams are effective in learning [19]. Some studies were done on modified essay questions (MEQs) [20, 21].

According to the lack of evidence for some assessment methods of students learning and the importance of this field in educational development, the aim of this study was to compare two methods of modified essay questions and multiple choice questions in occupational health engineering and work laws courses.

Materials & Methods

This semi-experimental study was performed during 2013 to 2014 on occupational health students of Mashhad University of Medical Sciences. The class of occupational health and work laws course in 2013 was considered as group A and the class of 2014 as group B. Each group had 50 students. All the samples were aware that their class will be part of a research program.

According to the curriculum "occupational health engineering and work laws" course has some general and specific chapters. The chapters of occupational health are definitions, physical, chemicals, biological, ergonomic factors and safety [10] and of work laws are work laws as a general, social laws, younger workers laws, women workers laws, harmful works laws and others [11]. The course was taught with lectures and presentation of PowerPoint for both groups by the same professor. The group A students were assessed by modified essay questions method and the group B by multiple choice questions method. Tests of the two groups were at the same level and their validity and reliability were confirmed in a pilot study ($r=0.85$).

Data were analyzed in SPSS 16 software by paired T test and odd's ratio.

Findings

The mean grade of occupational health and work laws course was 18.68 ± 0.91 in group A (modified essay questions) and was 18.78 ± 0.86 in group B (multiple choice questions) which was not significantly different ($t=-0.41$; $p=0.684$). The mean grade of chemical chapter ($p<0.001$) in occupational health engineering and harmful work law ($p<0.001$) and other ($p=0.015$) chapters in work laws were significantly different between two groups (Figure 1).

According to the odd's ratio, the risk of wrong answer in some of the occupational health chapters were more in group B and the risk of wrong answer in some of the work laws were more in group A (Figure 2).

Discussion

According to our results the total grades of the occupational health engineering and work

laws course were not different between two methods but some chapters such as chemical factors and others were significantly better by modified essay questions method and some like harmful work law chapter was significantly better by multiple choice questions method. It can be due to that the "chemical factors" chapter is more popular and practical for students and it must be learnt very well but some work laws items such as harmful work laws are at the special handbooks and may be changed during the career developments and students preferred just having some knowledge about them and refer to handbooks when they need in the real cases. Health ministry curriculum also emphasized on using the fit and new assessment methods [10, 11].

Figure 1) The comparison of grades' means in occupational health engineering and work laws between group A (modified essay) and group B (multiple choice)

Chapters	Group A	Group B	t	P value
Occupational health engineering				
Definitions	1.02±0.54	1.23±0.37	-1.612	0.114
Physical	1.47±0.07	1.42±0.22	0.997	0.334
Chemical	1.47±0.12	0.96±0.44	5.282	<0.001
Biological	1.50±0	1.50±0	-	-
Ergonomy	1.48±0.05	1.46±0.13	0.818	0.417
Safety	1.46±0.13	1.48±0.09	-0.199	0.843
Work laws				
Work law	1.48±0.05	1.48±0.09	0.228	0.775
Social law	1.50±0	1.48±0.09	0.884	0.380
Younger workers law	1.50±0	1.48±0.09	0.884	0.381
Harmful work law	0.86±0.56	1.44±0.28	-4.788	<0.001
Women workers law	1.50±0	1.50±0	-	-
Others	1.47±0.11	1.33±0.23	2.525	0.015

According to the odd's ratio and their confidence intervals, the risk of wrong answer in some of the occupational health chapters were more in group B by multiple choice questions method and the risk of wrong answer in some of the work laws were more in group A by modified essay questions method; Overall, MCQs had more wrong answers. These results are in accordance with Khan & Aljarallah in assessing the cognitive skills of undergraduate medical students [6]. Palmer & Devitt have also emphasized that MCQs must be designed properly for each purpose.

The possible difference between the students of two entrance years to university is a

limitation of this study. It is recommended that another study be done with more students in the same entrance year.

Figure 2) The odd's ratio of wrong answer in occupational health and work laws course in two groups

Chapters	Group A (modified essay)	Group B (multiple choice)
Definitions	1.300 (0.693-2.440)	0.813 (0.492-1.343)
Physical	0.900 (0.293-2.764)	1.180 (1.438-2.458)
Chemical	0.127 (0.033-0.487)	3.750 (2.072-6.788)
Biological	1.825 (0.412-2.437)	1.814 (0.420-2.357)
Ergonomy	0.746 (0.146-3.814)	1.205 (0.520-2.793)
Safety	1.567 (0.659-3.726)	0.580 (0.115-2.929)
Work law	1.143 (0.276-4.740)	0.889 (0.217-3.634)
Social law	1.823 (0.410-2.338)	1.765 (0.410-2.337)
Younger workers law	1.915 (0.420-2.347)	1.815 (0.310-2.536)
Harmful work law	3.714 (2.071-6.661)	0.095 (0.014-0.636)
Women workers law	1.812 (0.410-2.356)	1.525 (0.430-2.317)
Others	0.190 (0.029-1.252)	1.895 (1.288-2.787)

Conclusion

Modified essay questions and multiple choice questions methods have nearly the same student assessing value for the occupational health engineering and work laws course.

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Ethical Permission: The researcher got oral satisfaction from participants and told that cumulative data have been used and the names of the students were kept confidential.

Conflict of Interests: The author declares no conflict of interest.

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