ORIGINAL ARTICLE

The impact of various assessment parameters on medical students' performance in first professional examination in physiology

Olasupo Stephen Adeniyi, Sunday Adakole Ogli, Cecelia Omaile Ojabo[1], Danladi Ibrahim Musa[2]

Departments of Physiology, [1]Ophthalmology, and [2]Human Kinetics, and Health Education, Benue State University, Makurdi, Nigeria

ABSTRACT

Background: This study was carried out to assess the relationship between thevarious assessment parameters, viz. continuous assessment (CA), multiple choice questions (MCQ), essay, practical, oral with the overall performance in the first professional examination in Physiology. **Materials and Methods:** The results of all 244 students that sat for the examination over 4 years were used. The CA, MCQ, essay, practical, oral and overall performance scores were obtained. All the scores were rounded up to 100% to give each parameter equal weighting. **Results:** Analysis showed that the average overall performance was 50.8 ± 5.3. The best average performance was in practical (55.5 ± 9.1), while the least was in MCQ (44.1 ± 7.8). In the study, 81.1% of students passed orals, 80.3% passed practical, 72.5% passed CA, 58.6% passed essay, 22.5% passed MCQ and 71.7% of students passed on the overall performance. All assessment parameters significantly correlated with overall performance. Continuous assessment had the best correlation ($r = 0.801$, $P = 0.000$), while oral had the least correlation ($r = 0.277$, $P = 0.000$) with overall performance. Essay was the best predictor of overall performance ($\beta = 0.421$, $P = 000$), followed by MCQ ($\beta = 0.356$, $P = 000$), while practical was the least predictor of performance ($\beta = 0.162$, $P = 000$). **Conclusion:** We suggest that the department should uphold the principle of continuous assessment and more effort be made in the design of MCQ so that performance can improve.

Key words: Continuous assessment, essay, examination, MCQ, oral, practical

Address for correspondence:
Dr. Olasupo Stephen Adeniyi, Department of Physiology, College of Health Sciences, P. M. B. 102119, Benue State University, Makurdi, Nigeria.
E-mail: supoadeniyi@yahoo.com

INTRODUCTION

Assessments are educational tools that help teachers evaluate students, serve to motivate and help students structure their academic efforts and helps a teacher understand how successfully he is presenting the material.[1,2] In the medical school, multiple-choice questions (MCQs),[3-5] essays,[5,6] viva,[5,7] practical and continuous assessment (CA)[5,8] are used to assess students performance.

Haven conducted first professional Bachelor of Medicine (MBBS) examination at Benue State University, Makurdi, to students for five consecutive sessions; we decided to investigate the relationship of the assessment parameters, viz. continuous assessment, MCQ, essay, practical and oral with the students' overall performance in Physiology at the First professional MBBS examination.

Access this article online	
Quick Response Code:	Website: www.nigeriamedj.com
	DOI: 10.4103/0300-1652.122330

MATERIALS AND METHODS

The examination record of all students from five sets of students that had sat for the first professional MBBS examination in Physiology between 2008-2009 session and 2011-2012 session (within 4 years) was used. The dates of examination and the total number of students that sat for each examination are shown in Table 1. This included students that passed, re-sat the examinations and those advised to withdraw. The study was approved by Ethics Committee, Benue State University. Confidentiality was maintained, as there was no disclosure of the names of the students from whom the data were derived.

The Faculty presently adopts a scoring system in which continuous assessment contributes 30, MCQ-25, Essay-25, practical-10 and orals-10, all adding up to

100% at the final MBBS examination. However, to obtain equal weighting for all the assessment parameters of the final score, all the parameters were made up to 100 as follows:

Continuous assessment: 30 × 3.33 = 100
Essay: 25 × 4 = 100
MCQ: 25 × 4 = 100
Practical: 10 × 10 = 100
Oral: 10 × 10 = 100

In College of Health Sciences, Benue State University, total score of <50% is regarded as fail, score between 50% and 69% is considered as pass, while scores >70% is regarded as distinction.

Statistical analysis

Data were analysed using Statistical Package for Social Sciences (SPSS), version 17, values were expressed as mean ± SD. Percentages were calculated. Pearson's correlation coefficient (r) was calculated to determine the correlation between continuous assessment, essay, MCQ, practical, orals and the final score in Physiology examination. Standard multiple regression model was used to determine the best predictor of overall performance. The level of significance was taken to be $P < 0.05$.

RESULTS

Results of the 244 students that sat for Physiology examination are presented in Table 2. As shown in the Table, the best average performance was in practical (55.5%), while the average worst performance was in MCQ (44.1%). With the exception of the MCQ, students generally passed all component of the examination.

The assessment parameter with the highest percentage number of student that passed was oral examination where 81.1% (n = 198) passed and 18.9% (n = 4) failed, followed by practical examination, where 80.3% (n = 196) passed and 19.7% (n = 48) failed. The highest percentage fail was recorded in MCQ where 77.5% (n = 189) failed and 22.5% (n = 55) passed as shown in Figure 1.

All parameters of examination significantly correlated with the overall performance score [Table 3], with the CA having the highest correlation with the total performance (r = 0.801), followed by essay (r = 0.755), then MCQ (r = 677). The parameter with the least correlation was oral examination (r = 0.277) [Table 2].

In order to determine whether the independent variables were independently associated with overall performance, standard multiple regression analysis was conducted and the result showed that the independent variables could explain 97.3% of the variation in the overall performance score (R^2 = 0.973). Result showed that essay was the best predictor of performance in Physiology examination (β = 0.421, P = 000), followed by MCQ (β = 0.356, P = 000). The least predictor of overall performance was practical examination (β = 0.162, P = 000) as shown in Table 4.

Table 1: Type of physiology examination and the number of candidates that sat for the examinations

Type of examination	No. of candidates
MBBS Main exam (March 2009) Set 1	19
MBBS re-sit examination (May 2009) Set 1	4
MBBS Main examination (Jan, 2010) Set 2	44
MBBS re-sit examination (May, 2010) Set 2	10
MBBS Main examination (September 2010) Set3	43
MBBS re-sit examination (November, 2010) Set 3	14
MBBS Main examination (May, 2011) Set 4	60
MBBS re-sit examination (July 2011) Set 4	4
MBBS Main examination (November 2011) Set 5	42
MBBS re-sit examination (March, 2012) Set 5	4
Total no. of candidates	244

Table 2: Descriptive score of assessment parameters in the first professional MBBS examination in physiology

Parameters	Minimum (%)	Maximum (%)	Mean (%)	SD
CA	29.7	71.9	53.7	5.9
MCQ	12.8	70.5	44.1	7.0
Essay	22.8	76.4	51.5	9.0
Practical	21.0	79.0	55.5	9.1
Oral	20.0	90.0	53.7	13
OP	32.0	65.0	50.8	5.3

n = 244, CA-continuous assessment; MCQ-Multiple choice Question; OP-Overall performance

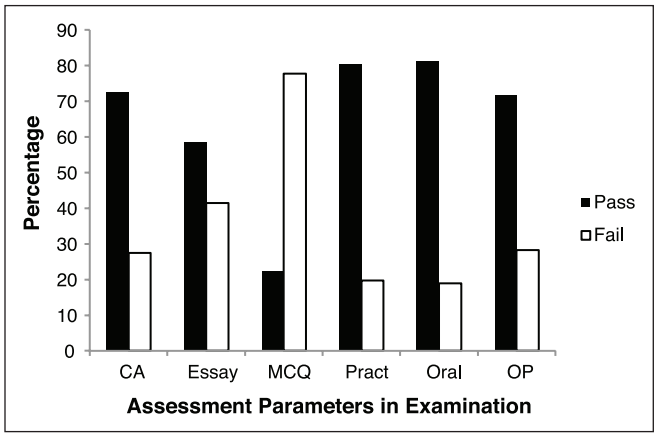

Figure 1: Percentage pass or fail in assessment parameters and overall performance in first professional MBBS examination in physiology n = 244; CA-Continuous assessment; MCQ-Multiple choice question; Pract-Practical; OP-Overall performance

Table 3: Correlation between assessment parameters in physiology examination and the overall performance

	CA	MCQ	Essay	Pract.	Oral	OP
CA	1	0.542**	0.494**	0.323**	0.094	0.801**
MCQ		1	0.293**	0.187**	−0.026	0.677**
Essay			1	0.384**	0.015	0.755**
Pract.				1	0.084	0.517**
Oral					1	0.277**
OP						1

n = 244, CA-continuous assessment; MCQ-Multiple Choice question; Pract-Practical; OP-Overall performance, ***P* = 0.000, **P* = 0.005

Table 4: Predictor of performance in the first professional MBBS examination in physiology

Dependent variable	β	*P* value
CA	0.332	0.000
MCQ	0.356	0.000
Essay	0.421	0.000
Practical	0.162	0.000
Oral	0.235	0.000

n = 244, CA-continuous assessment; MCQ-Multiple Choice question; Pract-Practical; OP-Overall performance

DISCUSSION

In College Of Health Science, Benue State University, external examiners are used for assessing orals rather than internal examiners. This removes the lack of objectivity that may arise from the teachers' prior knowledge of the students. This study showed that oral examination has the highest number of students' pass than any other component of assessment. This is similar to the report of Dakum *et al*., in a study carried out on final year medical students at the University of Jos.[5] However, oral examination had the least correlation with the overall performance of the students. This is also in agreement with the report of Torke *et al*.[9] It has been demonstrated that orals have low reliability as assessments of clinical competence; when the marks awarded to candidates by different examiners are compared there is low reliability between the marks. Some examiners tend to mark generously and some have a tendency to award low marks.[7,10] There is also evidence that the low reliability is due to content specificity, reflecting the fact that competence is related to the case or topic covered in the oral. Studies indicated that the mark awarded to a candidate may reflect factors other than the candidate's competence; namely anxiety, percentage of words contributed to the discussion by the candidate, the examiner's visual impressions of the candidate or the candidate's self-confidence.[11,12]

This study also showed that highest rate of failure was recorded in MCQ, and that more students passed essay question than MCQ. This is similar to the study of Dakum *et al*.[5] However, this is contrary to the report of Oyebola *et al*.,[13] and Pepple *et al*.,[14] where students performed better in MCQ than in essay. The higher rate of failure in MCQ in this group might be due to the fundamental pattern associated with MCQ, that is, negative marking associated with wrong answer provided.[5] It might also be because MCQs have wider coverage of the course than any other method of assessment, such that a student cannot avoid any section he or she has not read or understood. McKeachie reported that students preparing for essay tests focus on broad issues, general concepts and interrelationships rather than on specific details, and this results in somewhat better student performance regardless of the type of exam they are given.[6] Many researchers believe that multiple choice examinations are only suitable for testing factual information, whereas essay examinations test higher order cognitive skills.[15,16] However, other researchers believe that multiple choice tests can examine many of the same cognitive skill that essay tests do provided the questions are tailored with careful attention to quality by following good practice to avoid the pitfalls in their design.[17-19] Essay examination has its own short-comings, for instance, it can provide only a very limited sampling of attainment, with a small number of questions being included in any one test, and students who are lucky enough to select the right topics to revise tend to do best. Students who were cue-seekers' gained the best degrees and 'cue-deaf' students gained the poorest.

The better performance in essay than MCQ examination in this study is further supported by the higher correlation coefficient of essay examination with the overall performance than MCQ. This is contrary to the report of Shittu *et al*., however, they used a smaller sample size than that which is used in this study.[20] There was a significant correlation between essay examination and MCQ, though the relationship was weak. This suggests that the two methods of examination are related. Therefore we can say that the design of the MCQ has achieved a purpose close to essay questions in this study.

The result of this study showed that the continuous assessment had the best positive correlation with the final overall performance in Physiology examination. This shows the importance of continuous assessment and reveals that the final score of the students is strongly related to their performance all through the preclinical year and that the final score was not an accident. Continuous assessment places less emphasis on pure memory (particularly comparatively short-term memory) than terminal assessment, and correspondingly more emphasis on worthwhile learning in the deepest sense of the word.[21] Continuous assessment encourages regular, systematic study and discourages last-minute cramming, thus rewarding students who work steadily and conscientiously throughout their courses. It enables on-going monitoring of student performance to take place, it provide early

warnings about students having problems with a course, thus enabling appropriate remedial help to be provided in time for the student to improve.[21]

Regression analysis revealed that performance in essay examination was the best predictor of success in the overall score in Physiology. That is a student who passed essay is more likely to pass in the overall score. This is followed by MCQ as a predictor of performance. This further supports the claim that essay questions assess comprehension, the ability to integrate and synthesize, and the ability to apply information to new situations.[22] Essay gives an opportunity to assess the quality of students thinking. There was a positive correlation between practical and the overall performance (r = 0.517). However, practical examination was the least predictor of performance in the first professional examination. Therefore, even though practical examination in Physiology is important, performance does not well predict the overall performance. The correlation of practical in the overall score in this study is lower than that reported by Shittu *et al*.[20]

CONCLUSION

The result of this study reveals that there is a significant correlation between all the assessment parameters of the examination, viz. continuous assessment, essay, MCQ, practical and oral examination with the overall performance. The practice of giving continuous assessment to students should be held important. Efforts should be made to improve the design of MCQ questions and practical examinations to improve their effectiveness.

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How to cite this article: Adeniyi OS, Ogli SA, Ojabo CO, Musa DI. The impact of various assessment parameters on medical students' performance in first professional examination in physiolog. Niger Med J 2013;54:302-5.

Source of Support: Nil, **Conflict of Interest:** None declared.