

The academic value of a class test in a pharmacy undergraduate curriculum

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Abstract

In this study, the correlation between students' performances in class test (a summative continuous assessment) and end-of-semester examination of the same module in an undergraduate pharmacy curriculum were evaluated. Besides, the performances of the high and low achievers in the end-of-semester examinations for two integrated body system modules offered in the same semester (one module with class test and one module without class test) were also compared. The results showed that there was no correlation between the class test scores and the end-of-semester examination scores for both the high achievers and low achievers in most cases. This suggests that the students' performance in class test is not a good indicator of their performance in end-of-semester examination. However, class test may facilitate students' reflection of their state of learning and preparedness for end-of-semester examination.

Keywords: Pharmacy, Undergraduate, Assessment, Summative, Formative

Introduction

Assessments are classified into two categories: continuous (in-course) assessment and terminal assessment. The former is held on an on-going basis during a programme, in the forms of portfolios, reports, assignments or other assessment types usually aimed at assessing the non-knowledge aspects of learning such as practical and communication skills. In some instances, class tests held in a formal examination setting are also included as part of the continuous assessment to provide feedback to the students regarding their state of learning and preparedness for terminal assessment. Terminal assessment, on the other hand, focuses on assessing the acquisition of knowledge and some skills (eg critical thinking skill) in order to ascertain the student's competency level. It is usually held at the end of a relatively longer teaching period, such as the end of a semester.

It is debatable whether class test should be a formative or summative continuous assessment. Formative assessments aim at helping a student to learn, and thus are held during a programme with feedback given to the learner in relation to his strengths and weakness. On the other hand, the competence of graduates is assessed in summative assessment. It is well established that assessment drives learning (McLachlan, 2006). Some academicians are of the

opinion that class tests should be summative since this will further motivate the students to work consistently throughout a programme. From the students' perspective, continuous summative assessments are generally perceived to be rewarding in enhancing their learning experience (Trotter, 2006). Besides, they enable early remedial action to be taken for the students who have difficulty in a programme. However, too many summative assessments may result in the students being overloaded with assessments especially if the class tests are held during the period when the other assignments are due at the same time. Moreover, this approach does not encourage the students to adopt a proactive attitude towards learning. Evidence of students adopting a surface reproductive approach aimed at passing the examinations as a consequence of frequent summative assessments has been shown (Tan, 1992). In the absence of a detailed understanding of the subject matter, students will be weak in reasoning and knowledge integrative skills, which is an important outcome in a professional programme such as a pharmacy curriculum.

This study was carried out to provide evidence on the academic value of class tests in the Bachelor of Pharmacy curriculum. The curriculum is outcome-based, focusing on producing graduates who are knowledgeable, competent,

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professional, ethical, empathic, able to work effectively with other healthcare professionals, life-long learners, with a commitment to continuing professional development as well as evidence-based practitioners. Since student assessment is a powerful tool for manipulating the education process (Lowry, 1993), the findings of this study will have significant contribution to the continuous quality improvement exercise in enhancing and strengthening the outcome-based curriculum.

Methods

The Bachelor of Pharmacy (BPharm) programme is a four-year undergraduate programme that adopts an integrated curriculum. The integrated body system modules are offered in Semesters 2 to 6. The continuous assessments for these modules take the forms of portfolios of learning, Problem-Based Learning (PBL), practicals and logbook. Besides, mid-semester class tests (held in a formal setting) are included in the continuous assessments for some of these body system modules, namely Body System A in Semester 2; Body System B in Semester 3; Body System C in Semester 4; Body Systems D, E and F in Semester 5; and Body System G in Semester 6. On the other hand, Body System X in Semester 2 and Body System Y in Semester 3 do not have mid-semester class test. Questions in both class test and end-of-semester examination papers primarily test on students' knowledge within the module context.

Participants

The data collected to date were from two cohorts (C1 and C2) of the BPharm students. Other cohorts were not selected for this study because the sample size was insufficient. The total student number for the cohort C1 ranged between 78 and 75, while that for the cohort C2 ranged between 111 and 112 (the slight variation in number was due to absenteeism in some instances). The class test and end-of-semester scores in Semesters 3 to 6 for the cohort C1 and Semesters 2 to 4 for the cohort C2 were analysed.

Study design

In this study, the performances in the class tests (where applicable) and the end-of-semester examinations of two cohorts of students in these modules were evaluated in two ways:

- I. For each system module with class test, the correlation between the class test scores of the high and low achievers (N = 30 in each group) in the class test and their scores in the end-of-semester examination was evaluated. Besides, the students were also categorized as high achievers and low achievers according to their end-of-semester examination scores (N = 30 in each group), and the correlation between their class test and end-of-semester examination scores were studied.
- II. The end-of-semester examination scores of the high and low achievers in two modules (with and without class test) in the same semester were compared using the paired t-test.

All analyses were carried out using the SPSS version 11.5 software.

Results

Correlation between the class test and end-of-semester examination scores

1. Categorisation according to high and low achievers in class test

The Pearson correlation values for the various modules are presented in Table I.

Table I: Pearson correlation values between class test and end-of-semester examination scores in integrated body system modules (categorised according to performance in class tests).

Semester	Module	Cohort	Pearson correlation between class test and end-of-semester examination scores	
			High achievers in class test (N = 30)	Low achievers in class test (N = 30)
2	Body System A	C2	-0.174	0.537**
3	Body System B	C1	0.451*	0.116
		C2	0.324	0.335
4	Body System C	C1	0.195	0.245
		C2	0.291	0.352
5	Body System D	C1	0.271	0.156
	Body System E	C1	0.384*	0.141
	Body System F	C1	0.290	0.298
6	Body System G	C1	0.377*	0.228

* significant at 0.05 level; ** significant at 0.01 level

2. Categorisation according to high and low achievers in End-of-Semester examination

The Pearson correlation values for the various modules are presented in Table II. Where there is a significant correlation between the class test and end-of-semester examination scores, the Pearson correlation value is marked with an asterisk (at 0.05 level) or double asterisk (at 0.01 level).

Table II: Pearson correlation values between class test and end-of-semester examination scores in integrated body system modules (categorised according to performance in end-of-semester examinations).

Semester	Module	Cohort	Pearson correlation between class test and end-of-semester examination scores	
			High achievers in end-of-semester examination	Low achievers in end-of-semester examination
			(N = 30)	(N = 30)
2	Body System A	C2	0.194	0.436*
3	Body System B	C1	0.266	0.556**
		C2	0.133	-0.071
4	Body System C	C1	0.205	-0.090
		C2	0.162	0.433*
5	Body System D	C1	0.438*	0.367*
	Body System E	C1	0.284	0.154
	Body System F	C1	0.435*	0.246
6	Body System G	C1	0.324	0.026

* significant at 0.05 level; ** significant at 0.01 level

Comparison between the end-of-semester examination scores of a module with class test and a module without class test

Each cohort of students was categorised as high and low achievers according to their end-of-semester examination scores in the selected modules under evaluation. A paired t-test was carried out to compare the scores of the end-of-semester examination of the two modules (one with class test and one without class test) in the same semester. The mean values and p-values are presented in Table III. The difference is considered significant when the p-value is less than 0.05.

Discussion

The study has shown that students who perform poorly in class tests may not necessarily perform poorly in the End-of-Semester examinations. There is no significant correlation between the performance of the low achievers in class tests and their performance in the end-of-semester examinations in 8 out of the 9 instances. Likewise, there is no consistent trend in the performance of the high achievers in class test and their performance in the end-of-semester examinations in six out of the nine instances evaluated (Table I). When ranked according to the end-of-semester examination results, the low achievers in end-of-semester examinations are consistently

the poor performers in class tests in only four out of the nine instances. Meanwhile, the high achievers in end-of-semester examinations are also the high achievers in class tests in only two of the nine instances. These findings indicate that there is a poor correlation between the class test results and the end-of-semester results. Therefore, we can conclude that class test result does not provide a good prediction for the students' performance in end-of-semester examination.

A comparison of the end-of-semester examination results between a module with class test and a module without class test in the same semester was carried out to find out whether class tests contributed to students' preparedness for end-of-semester examinations. In Semester 2, the entire class performed significantly better in the module with class test (Body System A) ($p < 0.05$). For the high achievers in both modules, the mean scores for the module with class test are higher and particularly significant in one of the groups analysed. For the low achievers in these modules, one group showed a significantly higher mean score in the module with class test, whereas the other group showed a significantly higher mean score in the module without class test. In Semester 3, the students generally performed significantly better in the module with class test (Body System B). Where there was a significant difference in the end-of-semester mean score, the high and low achievers in both modules obtained higher scores in the module with class test. The findings showed that the value of class test in helping the students to learn and better prepare for end-of-semester examination cannot be denied.

There are many contributing factors to the findings in this study. As students are often pressured to meet the deadlines of the other forms of summative continuous assessments (eg. assignments and reports) during a semester, they may not be able to prepare adequately for a class test which is held during a semester. In some cases, the situation is made worse by several class tests for different modules held consecutively one after another. Consequently, it prevents students from exploring the topics widely but instead focusing on topics that they think will be featured in the class tests or examinations. Secondly, a difference in the format of the class test paper and that of the end-of-semester examination paper for the same module should also be taken into account for the lack of predictive value of the class test results. A class test in the form of multiple choice questions primarily tests on factual knowledge, whereas an end-of-semester examination paper consists mainly of short answer questions and modified essay questions require a thorough understanding of the subjects as well as the ability to apply the knowledge learned.

From this study, it can be concluded that continuous feedback can enhance the students' learning. However, it is believed that students will benefit equally from a formative rather than summative continuous assessment on acquisition of knowledge. This type of formative continuous assessment can be done at a time of the student's preference in a stress-free environment. In this way, a student is responsible for his

learning and the process also inculcates the student's lifelong learning and time management skills which are the other important outcomes of the BPharm programme. Besides, it has also been suggested that formative assessments may promote greater self assessment accuracy and effective study behaviours (Relan *et al.*, 2006).

Conclusion

In conclusion, this study showed that students' performance in class tests generally did not give a reliable prediction of their performance in End-of-Semester examinations. Continuous assessment is useful in enabling the students to gauge their learning progress and address their weakness in a particular topic of learning so that early remedial actions can be taken. However, a formative mode may be more suitable in an adult learning environment for self-assessment of their understanding of the topics taught, particularly in a curriculum that emphasises on lifelong learning. Summative continuous assessments should then focus on the other expected qualities and skills of the graduates.

References

- McLachlan, J.C. (2006). The relationship between assessment and learning. *Medical Education*, 40, 716-717.
- Trotter, E. (2006). Student perceptions of continuous summative assessment. *Assessment & Evaluation in Higher Education*, 31, 505-521.
- Tan, C.M. (2002). An evaluation of the use of continuous assessment in the teaching of physiology. *Higher Education*, 23, 255-272.
- Lowry, S. (1993). Assessment of students. *British Medical Journal*, 306, 51-54.
- Relan, A., Guiton, G., Sopher, M. Goldhaber, J. (2006). Do formative assessments promote self assessment accuracy? A study of second year medical students' predictions about performance, *Center for Educational Development and Research, University of California, Los Angeles*, Paper AERA 2006a.

Table III: Paired t-test results comparing the mean scores in the end-of-semester examinations of integrated body system modules (* = significant at 0.05 level)

Semester	Cohort	Modules of comparison		Groups	Mean scores (%)	p-values
		Module with class test	Module without class test			
2	C2	Body System A (A)	Body System X (X)	High achievers in A (N = 30)	81.1 (A); 72.8 (X)	0.000*
				Low achievers in A (N = 30)	58.2 (A); 62.7 (X)	0.004*
				High achievers in X (N = 30)	76.2 (A); 75.6 (X)	0.671
				Low achievers in X (N = 30)	63.5 (A); 58.2 (X)	0.002*
				Entire class (N = 112)	70.6 (A); 67.7 (X)	0.000*
3	C2	Body System B (B)	Body System Y (Y)	High achievers in B (N = 30)	80.4 (B); 64.2 (Y)	0.000*
				Low achievers in B (N = 30)	59.5 (B); 56.7 (Y)	0.085
				High achievers in Y (N = 30)	73.7 (B); 70.2 (Y)	0.013*
				Low achievers in Y (N = 30)	66.9 (B); 51.1 (Y)	0.000*
				Entire class (N = 110)	70.7 (B); 61.0 (Y)	0.000*
	C1	Body System B (B)	Body System Y (Y)	High achievers in B (N = 30)	74.2 (B); 69.0 (Y)	0.001*
				Low achievers in B (N = 30)	55.2 (B); 57.0 (Y)	0.244
				High achievers in Y (N = 30)	71.2 (B); 72.6 (Y)	0.351
				Low achievers in Y (N = 30)	59.5 (B); 53.1 (Y)	0.000*
			Entire class (N = 78)	64.6 (B); 62.6 (Y)	0.048*	