Novel use of adaptive exam in university education Pharmacy trial

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Abstract

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Objectives: We conducted a preliminary CAT as a pilot study to be developed and considered for implemented as a certified worldwide exam in pharmacy faculties in the future.
Method: Out faculty of Pharmacy developed and applied a CAT in the psychiatric clerkship. CAT has been implemented at the end of clerkship as an additional bonus exam and as a pilot study for considering such exam at our faculty in the future.
Results: In general, there is a positive attitude of pharmacy students towards CAT. Most students were satisfied about different evaluation points related to this exam.
Conclusion: This preliminary CAT study showed positive attitudes among pharmacy students towards this type of exam. This result indicates that this preliminary conducted exam can be developed in the future to be sophistically implemented in pharmacy faculties as it has been successfully conducted in other disciplines.

Introduction

Pharmacy practice and education has developed over the past decade. As educational assessment is a fundamental element in the learning process (Desirée, et al. 2007), pharmacy schools should keep aware of the emerging development in assessment practices and processes to remain contemporary (Heidi 2005). Despitethat, few studies conducted to review the status of assessments in schools of pharmacy (Heidi 2005).With the development of technology, there is a need for educators to become aware of the developed practices in the domain of computer based testing. Computer adaptive testing (CAT) is the most important assessment development of the 90s and currently it is among the most desirable assessment approaches (Salma 2012).

CAT, in general, is considered to have some disadvantages as well as several advantages that have been discussed in several studies (Salma 2012; John 2015).
While it has been conducted in the field of medicine (Salma 2012; Hermi and Achour 2015; Kreiter, Ferguson, and Gruppen 1999), up to our knowledge, CAT has not been studied yet in pharmacy schools.
In this study, we have introduced the first preliminary implementation of CAT as a pilot study to be developed and considered for implementation as a certified exam in our faculty in the future.
Methods
Our faculty of Pharmacy developed and applied a CAT in the psychiatric clerkship of doctor of pharmacy curricula during the academic year 2015/2016. CAT has been implemented at the end of clerkship as an additional bonus exam

and as a pilot study for considering such exam at our faculty in the future.

Participants

Fifty-eight students were asked to take the exam and to participate in the study, all students involved in the study (100% response rate).

CAT development process

CAT was developed by 3 educators who are involved in the teaching of this clerkship. The questions' difficulty was determined by the clerkship educators based on their experience, quizzes, previous difficulty exam analysis for questions types and the difficulty of subjects and other assessment process during the clerkship.

CAT Setting

All students were administered 30 items in one hour. Theses 30 question were divided into three discrete levels, hard, moderate and easy (each level has 10 question). An examinee is initially administered 10 items with a moderate level of difficulty from the questions bank. If the student achieves 70 percent or more of correct answers, the next level (the next 10 questions) faced would be from the hard level; and if answered only less than 30 percent of questions correctly, an easier level would be presented, and if the student answers between 30% and 70% correctly, same level questions would be introduced in the second level, and third level would be selected the same way based on the second level achievement.

CAT scoring

Hard questions give 4 points, moderate questions equal 2 points, and 1 point was given for each easy question

Students' feedback

After the exam, students were asked to fill a 14-item questionnaire which was designed to evaluate the exam. The questionnaire used a 5-level Likert item to meet students' response to each question. Students were asked to complete the questionnaire on a voluntary basis immediately after finishing the exam, before leaving the examination venue. They were assured that the information they provided would remain confidential and their identity would not be disclosed.

Ethical Considerations

For this type of study, IRB ethical approval is not applicable according to our university regulations.

Results & Discussion

All students responded to the questionnaire (response rate 100%). Table 1 shows the students' feedback regarding the exam. Although most students were not adequately prepared for the exam, in general, there was a positive attitude towards most of the exam evaluation aspects. Most students were satisfied about the structure and format of the exam, the challenge of the exam to do critical thinking, and the ability of the exam to show student's skills and knowledge and to motivate students to respond. In addition, students were also satisfied about the helpfulness of the exam and the correlation of the exam with the aims of the course. Students were highly satisfied about the time allowed for completing the exam and the appropriateness of the quantity of the questions. Finally, there was a disparate about the other evaluation points.

Table 1: Students feedback about CAT

Points of evaluation	Strongly agree N (%)	Agree N (%)	Uncertain N (%)	Disagree N (%)	Strongly disagree N (%)
I was adequately prepared for the exam	0 (0)	4 (6.9)	9 (15.5)	12 (20.7)	33 (56.9)
The exam was generally appropriate in content	2 (3.4)	32 (55.2)	18 (31.0)	5 (8.6)	1 (1.7)
The quantity of the questions was appropriate	3 (5.2)	46 (79.3)	7 (12.1)	1 (1.7)	1 (1.7)
The structure and format of the exam was appropriate	4 (6.9)	36 (62.1)	13 (22.4)	4 (6.9)	1 (1.7)
The examination process was	2 (3.4)	12 (20.7)	16 (27.6)	24 (41.4)	4 (6.9)

complicated (not comfortable)					
The scoring system of the exam is appropriate	3 (5.2)	26 (44.8)	19 (32.8)	9 (15.5)	1 (1.7)
The exams challenged me to do critical thinking	7 (12.1)	30 (51.7)	15 (25.9)	4 (6.9)	2 (3.4)
This type of exam helps me show my skills and knowledge	5 (8.6)	31 (53.4)	11 (19.0)	7 (12.1)	4 (6.9)
The exam creates a positive impression that motivates students to respond?	6 (10.3)	33 (56.9)	9 (15.5)	8 (13.8)	2 (3.4)
The time allowed was **NOT** appropriate for completing the examination	2 (3.4)	5 (8.6)	9 (15.5)	22 (37.9)	20 (34.5)
The exam was easy	1 (1.7)	9 (15.5)	27 (46.6)	12 (20.7)	9 (15.5)
The exam	1	9 (15.	14	26	8

did **NOT** meet the aims of the course?	(1.7)	5)	(24.1)	(44.8)	(13.8)
The exam was helpful for me	7 (12.1)	34 (58.6)	15 (25.9)	1 (1.7)	1 (1.7)
I prefer this type of exam over the ordinary type of exams	10 (17.2)	21 (36.2)	15 (25.9)	3 (5.2)	9 (15.5)

Student assessment is a fundamental element in learning process to evaluate learning outcomes. Educators evaluate students to direct and motivate them based on their achievement (Desirée, et al. 2007; Mahmoud, Ra'ed, and Ashraf 2015).

In general, students' attitudes towards computer-based exam was tended to be positive, this complies with other studiesresults (Mahmoud, Ra'ed, and Ashraf 2015; Tobias et al. 2012).

Most students were satisfied with the benefits of the exam in the clerkship specifically about the general help of the exam for them and ability of the exam to show their skills and knowledge and they also agreed that this exam meets the aims of the course. These results are important to monitor the successful implementation of the exam in the clerkship as it has been shown that student's feedback is a good tool to monitor the didactic quality of clerkships (Durak et al. 2008).

Students showed a high satisfaction about the time allowed for completing the exam and the appropriateness of the quantity of the questions, the results clearly clarify why adaptive exams result in more accurate determining of whether a student has mastered a particular educational area using fewer test questions than do conventional tests (David and Gage 1984).

The exam created a positive impression that motivates students to respond and challenged them to do critical thinking, these aspects are important to capture students' interest and to involve them in the learning process.

The disparate evaluation of students for the exam content, complexity and difficulty can be related to the inadequately preparation for the exam mainly because it was introduced as preliminary bonus exam rather than mandatory test, which was so because it is in its rudimentary phases to be developed and implemented in the future as a certified exam in the faculty.

Most students were either agreed or neutral about the scoring system of the exam, this is important as it has been shown that the intelligent question selection process, specific to each examinee, can result in precise estimates of student's ability (John 2015).

Although there is some preference proclivity towards this type of exam over the conventional type of exams, this is again because this type of exam is still in its pilot phase and migrating ordinary exams to CAT requires several trials, simulations, and other considerations and constraints that need to be investigated before the implementation of CAT, but once implemented, CAT has several advantages over ordinary exams (John 2015).

Finally, the positive results from this study show that this preliminary conducted exam can be developed in the future to be sophistically implemented in pharmacy faculties as it has been successfully conducted in other disciplines.

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