RESEARCH ARTICLE

Early transition towards a computer-based examination system: The perceptions of senior university students in the Middle East

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Abstract

Computer-based examination (CBE) systems are a widespread technique used by some higher educational institutions in Western countries. However, this new learning technology is starting to gain popularity worldwide, including in the Middle East. Therefore, it is important to investigate the perceptions of students in the Middle East to the transition from a paper-based examination (PBE) system to a CBE system before widespread implementation. The objective of this survey study was to explore the perception of senior students at the College of Pharmacy, University of Sharjah, towards the transition from the PBE system to the CBE system in order to avoid possible risk factors. Thus a cross-sectional survey study was conducted on senior students at the College of Pharmacy, University of Sharjah after their first exposure to a mock exam followed by midterm exams using the CBE system. The results showed that there was a strong relationship between the students' early experience with the CBE system at their high school, and type of education system to the students' acceptance of employing the CBE system. Around 80% of the students did not like employing the CBE system. The students explained their negative perception regarding the use of the CBE system was due to their fear of employing a new system (43% of students); and the insufficient training procedure (24% of students). However, they suggested that Pharmacy Practice (46%), Pharmacology (27%), Pharmaceutics (24%) and Clinical Pharmacy (20%) can be the best subjects to apply CBE systems. Identifying students' perceptions and feedback may enable higher education institutes to detect unintended consequences of this change and potential areas to improve whilst transitioning towards a CBE system.

Keywords: *Examination, Computer-based Examination, Pharmacy Students, Middle East*

Introduction

Assessment and examination are integral components of effective education and the student learning process, and hence can directly help in improving students' learning achievement. With the advancement of learning technology, universities and colleges around the world are rapidly switching to computer-based examination (CBE) and assessment (Al-Qdah & Ababneh, 2017; Rajalaksmi, & Simon, 2017), and has emerged as an innovative assessment approach in the United States of America USA (Monaghan *et al*., 2011). Monaghan *et al.* (2011) reported that 80% of US schools and colleges are using electronic testing to assess student learning.

O'Brocta (2013) advocates the use of CBE systems at Wegmans School of Pharmacy, New York in order to improve documentation of student achievement and simplify the assessment process. Furthermore, it can reduce the faculty workload, since it offers fast

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assessment processing (Terzis & Economides, 2011; Pawasauskas, Matson & Youssef, 2014), a cost-effective approach (Chua, 2012), an automated recording system (Faniran & Ajayi, 2016), and immediate scoring and feedback to students in the case of multiple-choice question exams (Boevé *et al.*, 2015). These benefits have encouraged higher education institutes around the world to transition from using paper-based examinations (PBEs) to CBEs (Terzis & Economides, 2011; Chua, 2012; O'Brocta, 2013; Pawasauskas, Matson & Youssef, 2014; Boevé *et al.*, 2015).

Assessment of students at the College of Pharmacy, University of Sharjah has traditionally been done through manual grading of paper-and-pencil written essays, short answers and by using Scantron answer sheets for grading multiple-choice questions. Although this method works well, it does not fully match the University's vision which includes interactive and technology-based teaching methods. Faculty members are overloaded by managing and scoring exams while it is difficult to provide students with feedback and implementing remediation in a timely manner. Thus the proposed use of CBE at the College of Pharmacy, University of Sharjah aimed to enhance the assessment process, provide students with timely feedback, help in reducing the workload of faculty members and enable them to focus on continuous improvement of the overall learning process.

As a first step toward the transition to the CBE system, it is important to explore students' perception towards the new technology by conducting a study to measure the possible methods of CBE implementation. Despite the widespread use of CBE in higher education and its well-documented benefits over the traditional PBE system (Boevé *et al*., 2015; Faniran & Ajayi, 2016), student perceptions have the potential to impact ongoing and future usefulness of technology within an academic setting (Wadley *et al*., 2014). Students' positive or negative perceptions towards the use of technology have been found to have a significant influence on their attitude, acceptance and propensity to use technology (Lee, Yoon & Lee, 2009; Shroff, Deneen & Ng, 2011). Despite the potential benefits of using CBE, its value will not be reached if users do not accept it and realise its benefits (Lee, Yoon & Lee, 2009).

Some prior research in the area of students' perception of the CBE system showed students' reluctance to accept CBE in both Western and non-Western countries (Tella & Bashorun, 2012; Jawaid *et al*., 2014; Wadley *et al*., 2014; Guasp *et al*., 2018). Wadley *et al.*(2014) reported initial student and faculty resistance to the transition to the CBE system at Howard University, College of Pharmacy . Guasp *et al*. (2018) also reported students' resistance to online exams at the University in Valencia, Spain. Tella and Bashorun found 90% of students at a Nigerian university felt frustrated when using a CBE system (Tella & Bashorun, 2012). Another study of health science students at a Pakistani university reported 76% of students were not confident using CBEs (Jawaid *et al*., 2014). Thus, it is important to identify the factors that promote students' positive perception and try to avoid the

negative ones. Senior students at the College of Pharmacy, University of Sharjah participated in a survey after their first exposure using a CBE system to test their readiness for the use of new technology. A cross-sectional survey was performed with senior students (students at the end of their 3rd year) at the College of Pharmacy, University of Sharjah. The survey was constructed to measure the perception of senior pharmacy students toward the implementation of a CBE system.

Method

A survey was developed by compiling modified questions from similar articles in order to suit the current study objectives. The survey was then reviewed and adjusted by two faculty members in order to validate the questions. The survey was piloted and checked for face validity before distribution to the students. The internal reliability was tested by calculating the Cronbach *alpha* value (Cronbach Alpha 0.72). The survey was distributed to all 100 enrolled senior students. The survey was conducted in English and included nine questions (Table I) in order to identify the correlation of accepting the use of the CBE system to students' demographic data (gender, cumulative grade point average [cGPA] and type of high school), perception of implementing the CBE before and after suitable training, suitability of applying the CBE system, previous use of CBE systems, and reasons behind the acceptance or refusal of implementing CBE systems.

Participation in the study was completely voluntarily. The study protocol and the survey questions were reviewed and approved by University of Sharjah ethics committee before the commencement of the study. The survey was administered in a Pharmacognosy class and the students allowed ten minutes to finish the survey. The students were subjected first to a mock exam including questions regarding their age, year of study and other simple questions to test their ability to use the system. A month later, students undertook their midterm exams in the subject of Pharmacognosy using the CBE system. The survey was then distributed to the students two-days after taking their midterm exam.

The survey data were collected and entered on SPSS statistical software. Descriptive statistics were calculated and presented as percentages. Correlations between categorical variables were examined using the *chi* square test and *p*-value <0.05 was considered as statistically significant.

Results

Ninety-five students responded to the survey (response rate of 95%), a summary of the students' responses to the CBE system questionnaire was described in Table I. The survey indicated that ~ 80% of the students disliked using the system, and only 6% liked the experience. The

Table I: Students' responses to the use of CBE system

Item	Response	Results		
Students' acceptance for implementing the CBE system	95	**Yes** 15	**No** 80	
Students' acceptance after experience the use of CBE	95	**Yes** 21	**No** 74	
Proposed reason for dislike the use of CBE	79	**Fear of new system** 43	**Not fully aware** 12	**Not well trained** 24
Best subject to employ the CBE system	93	**Pharmacy practice** 66	**Pharmacology** 27	**Others** 42
Possible future implementation	91	**Yes** 25	**No** 66	
Gender response	94	**Male** 12	**Female** 82	
Cumulative Grade -point average (cGPA)	94	**>3** 63	**2-3** 30	**<2** 1
Type of high School	94	**Arabic** 65	**International** 29	
Experience with CBE at high school	94	**Yes** 21	**No** 73	

reason behind the dislike was mainly fear of applying the new system (43%) and insufficient training (24%). The students suggested that the most appropriate subjects that can easily apply CBE systems can include Pharmacy Practice (46%), Pharmacology (27%), Pharmaceutics (24%) and Clinical Pharmacy (20%). However, Medicinal chemistry received the lowest percentage (2%).

Figure 1: Correlation between the type of education system and previous examination system at high school and the acceptance use of CBE at the university level
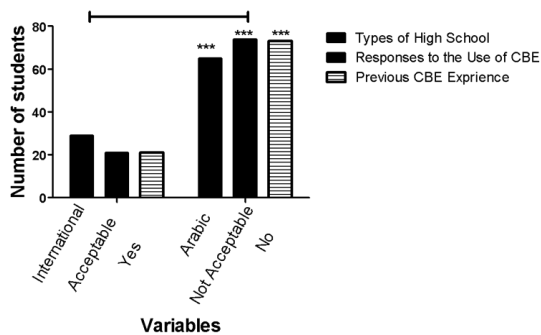
Yes and No representing the previous use of CBE at high school

It has been proposed that students with high cGPA are more accepting of employing new teaching technologies (Schneberger, Amoroso & Durfee, 2008). Although 63% of the students have high cGPA (more than three) and around 30% of the students have cGPA between 2-3, 66% of the students in total were not accepting implementation of the CBE system. There was no

statistically significant correlation between the cGPA and the acceptance of implementing CBE (*p*-value=0.36). On the other hand, there was a strong correlation between the acceptance of the implementation of the CBE system and the early use of CBE during high school education. Students who have been using CBE in the past were more accepting of the use of CBE systems than those who had not used it previously (*p*-value<0.05) (Figure 1). Moreover, there was a statistically significant correlation between the type of high school education and the acceptance of implementation of CBE where students from international schools tend to be more accepting of implementing the CBE system (*p*-value<0.05) (Figure 1).

Discussion

The survey employed in this study intended to explore the perception of senior students towards using a CBE system for the first time during their university studies. As indicated by these findings, there was a strong correlation between the low student acceptance of the CBE system and their previous experience using CBE systems. This finding supports previous studies indicating that students who have prior exposure to CBE were more accepting of the use of a CBE system (Jawaid *et al.*, 2014; Garas & Hassan, 2018). Furthermore, most students in this study (~80%) were uncomfortable using the CBE system, which is consistent with previous non-Western studies (Tella & Bashorun, 2012; Jawaid *et al.*, 2014; Guasp *et al.*, 2018). The fear of applying a new system and the insufficient training were the main reasons for students' reluctance to use the CBE system. Students showed concern that CBE could negatively impact their exam scores. However, previous studies indicated that, if properly implemented, CBE has little or no effect on student performance and exam scores (Bloom *et al.*, 2018).

On the other hand, literature from non-Western cultures, including African and Middle Eastern cultures, indicated that students who claimed to have previous computer experience also faced some challenges when applying CBE. These challenges included: slow internet connection (Faniran & Ajayi, 2016); looking at the computer screen for a long time, and lacking underlining and making notations (Garas & Hassan, 2018). Technical problems and glitches like computer, network and power failure and possible data loss are also some of the challenges that students can face before or during taking the CBE (Al-Qdah & Ababneh, 2017). Other factors that might negatively affect students' acceptance to use the CBE system may include computer use anxiety, personal self-confidence and preference, and lack of computer skills (Tella & Bashorun, 2012).

Another major factor that can affect the perception of students towards CBE can be related to students' cultures. This study showed that there is statistical significant correlation between the type of high school education and the acceptance of implementation of CBE; where students who graduated from an international school were more accepting of the CBE system implementation (p-value<0.05). Consistently, a comparative study run on students from Mediterranean and Nordic cultures also showed a strong correlation between learners' cultures and the use of computers-based learning technology (Lee, Yoon & Lee, 2009). In another study, Terzis and Econmides also reported that cultural differences can affect the students' acceptance of the use of CBE (Terzis & Economides, 2011).

The findings from this study also indicated that there was no statistically significant correlation between the cGPA and the acceptance of implementing the CBE system. This finding was not expected when compared to another study that indicated that students with higher cGPA are more accepting of new teaching technology including a CBE system (Schneberger, Amoroso & Durfee, 2008).

The present study is considered as an addition toward understanding the perception of Middle East students to the use of CBE systems and recommending slow-transition strategies to be considered when implementing CBE. Since the findings from this study indicate that participation in a CBE did not change students' perception, it is important that students receive extensive training prior to implementation of CBEs to eliminate their exam anxiety (Jimoh, Shittu & Kawu, 2012). Wadley and colleagues also recommended slower implementation of CBE over two semesters to allow easier transition (Wadley *et al*., 2014). In a non-western study, the authors recommended backup generators, computers, and technical support to be available during the administration of CBEs (Bloom *et al*., 2018). They also recommended students' answers to be frequently and automatically saved to avoid any data loss (Bloom *et al*., 2018).

Conclusion

This study was conducted in order to measure the level of readiness of students to apply CBE systems and allow appropriate transition to CBE systems. The results from this study indicated that senior students from the college of Pharmacy, University of Sharjah were resistant to the use of CBE systems mainly because of insufficient training, lack of experience of using CBE systems during their previous education levels. Thus it is recommended that students should be given enough training prior to transition to CBE systems in addition to slow transition to ensure sufficient experience for students and to improve their acceptance.

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