Research letter

Transitioning to computer-based testing

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Abstract

Objective: To review the implementation process of the University of Rhode Island's transition to computer-based testing and their students' and faculty perceptions of the software utility.

Methods: ExamSoft© testing software was selected based on the best fit for the pharmacy curriculum and integration with university factors. Faculty received training and piloted the software in elective courses. Description of the exam development, administration of exam, and evaluation of performance is provided. Student and faculty perceptions about the utility of computer-based testing were collected by pre- and post-survey questions.

Results: The majority (75%) of students had a favorable response to the integration of computer-based testing in their course. Most students (81.3%) supported the use of technology in their education and 87.5% felt comfortable using the software after it was implemented. Overall, 71.9% and 84.4% students reported they liked receiving immediate feedback from computer-based testing and assessment of their progress within the pharmacy curriculum, respectively. Less than 7% of students stated that they witnessed cheating by another student, as well as, that they also felt less of a need to cheat reduction strategies by the College after the implementation of computer-based testing. The initial faculty response following implementation of the software was equally positive.

Conclusion: The implementation of the computer-based testing software was straightforward and cost effective. Overall success of our transition was measured by student and faculty views, to which were favorable on all areas of survey evaluation including software usability, assessment of student performance, cheating-related issues, and faculty workload.

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Introduction

Technology has been shown to have beneficial effects in certain classroom settings.[1] Approaches that have been shown to be beneficial have several common factors: demonstrated cost-effectiveness, usability, and reliability.[2] Computer-based testing (CBT) software has been recognized

since the 1990s, although many colleges are slow to adopt this testing method. In one study, 75% of students felt that CBT was beneficial to their learning because of the ease of access they had to feedback on their performance.[3] Additional benefits to CBT methods include rapid access to test results and feedback, ability to re-score or adjust answers on exams when needed, availability of longitudinal data for long-term performance assessment, and reduction of cheating potential as the testing environment creates a more level playing field. Studies suggest that cheating prevalence is steadily increasing in health disciplines that place emphasis on high ethical standards, integrity and professionalism, such as medicine, pharmacy, and nursing.[4–8] Pharmacy schools specifically have reported academic dishonesty as an issue,

and one study found that 80% of students admitted to at least one incident.[9] Additional findings observed the prevalence of academic dishonesty within pharmacy curriculum (examinations, homework, or practical applications) to be as high as 74–90%.[10,11] Furthermore, in most health professions, CBT methods are widely used for high-stakes exams, such as licensure.[12] Therefore, introducing this technology as part of students' college experience better prepares graduates for the situations they will encounter as they begin their careers. The major drawback to CBT relates to technology-related difficulties, such as network connectivity or software compatibility. Software options must be carefully evaluated for potential detrimental effects. This article will describe numerous facets of the transition from paper-based to computer-based testing at a land-grant public university.

Background and rationale

The University of Rhode Island College of Pharmacy offers a six-year Doctor of Pharmacy (PharmD) program. The College has a requirement that all students entering the first professional year (P1) of the program have a laptop. This requirement was in place for several years prior to the implementation of CBT. Student enrollment has been steadily increasing annually, and the incoming freshman classes are expected to enroll approximately 130 students. The University uses Sakai for its learning management system (LMS), which allows faculty to post course materials; administer unsecured quizzes, tests, or homework; post grades; and create a variety of community discussion forums. Previously, the primary method of administering examinations, quizzes, and homework assignments was predominantly paper based. This method required either manual grading or utilization of an optical mark recognition (OMR) scanner for Scantron© forms.

In our consideration of transitioning to CBT, the cost of various methods of testing was taken into consideration. To start, we evaluated our costs for administering paper-based tests and determined that the annual cost for this approach was approximately $23,500. This figure took into account direct and indirect costs associated with exam preparation, exam administration, and exam storage. Detailed description for each of these cost items is provided in Table 1. Additionally, policy at our University requires that examination documents be stored for two semesters following the semester in which the course took place. Due to the nature of our coursework, this required approximately 16 drawers of filing cabinet space annually to comply with this policy. Over time this created a space burden. From an environmental perspective, the amount of paper utilized annually in this method accounted for 70 exams and quizzes for over 300 students.

A further issue with paper-based testing was a potential for student cheating. Reports from students and faculty indicated a need to address this prevalent concern. As a result, we explored transitioning examination methods from paper based to computer based. Our objectives in this endeavor included development of an environmentally friendly mechanism to administer examinations, reduction of cheating potential, improvement of remediation and assessment of competencies, and containment of costs or resources associated with exam administration, within the pharmacy curriculum.

The primary aim of this paper is to describe our implementation process, and secondarily, faculty and students' perception of technology usage, assessment of performance, and cheating-related issues. The University of Rhode Island's Institutional Review Board reviewed and approved this study.

Methods

Software selection

In 2011, we began to research various software and hardware options that were currently available for

Table 1
Cost analysis of paper-based testing methods

Item	Comments	Approximate value
Exam preparation	Secretarial time @ $21–30 per hour; 30 minutes per each required class exam, 10–15 minutes per elective class exam	$6020
	Photocopying @ $0.05/copy	
Exam administration	Faculty member(s) to proctor exams: ~$50 per hour for associate faculty member	$6930
	Teaching assistants (TA) needed to help proctor: $19.30–20.56 per hour for TA	
	On average, one additional faculty member + three TAs to proctor a required class exam	
	Grading: use of OMR ($0.10 per Scantron® form)	
	Manual grading: assumes two hours/exam	
Exam storage	Annual maintenance of four-drawer filing cabinets[27]	$9600
Other	Milestone exams[a]: use of preparation, grading, and faculty proctors	$950
Total annual cost estimation		$23,500

[a] Milestone examination is an annual exam that consists of capstone questions for the current year of content.