

Open Book Testing in Online Learning Environments

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Abstract

One continuing concern associated with online courses is assessment of student performance. One option for online assessment is the use of open book tests. This study investigated the impact of training in open book test-taking strategies on student test performance in online, timed, unproctored, open book tests. When the tutorial was required immediately before the midterm examination, the experimental group scored significantly higher than the control group. The effect size or magnitude of the difference in means was moderate. When the tutorial was completed immediately before the midterm examination but was not completed before the final examination, the experimental group's mean final examination score was higher than the control group's score, but the difference was not significant.

Introduction

There is increasing evidence that online course and program offerings have penetrated the mainstream of colleges and universities across the country. To illustrate, Allen and Seaman (2005) report that the overall percent of schools identifying online education as a critical, long term strategy grew from 49% in 2003 to 56% in 2005.

With the proliferation of online courses as part of many college and university degree programs come many concerns about the quality of online courses. Concern over the new role of faculty, establishing effective communication with students, motivating students, and assuring learning outcomes are growing (Yang & Cornelious, 2005). A continuing concern regarding learning outcomes is associated with assessment of student performance.

A variety of performance assessments, including examinations, should be employed to assure quality in online instruction (Yang & Cornelious, 2005). Academic integrity of the evaluation process is of particular concern in an online environment. According to Olt (2002), one way to help ensure academic integrity in online courses is through the use of open book examinations.

Open book testing may also promote more realistic learning opportunities that emphasize higher order thinking skills. Feller (1994) believed that closed book examinations test only what students can memorize, while open book examinations have an increased potential to measure higher level thinking skills and relate more closely to real-world work environments. He believed the open book examination was one method for incorporating realistic, open-ended tasks into higher education.

In the work environment, individuals use multiple pieces of reference materials when they need to answer a question, analyze and issue, prepare a report, or solve problems. Open book examinations can eliminate the need for total rote memorization of many pieces of information and allow the use of reference materials instead. These tests have the potential to better measure students' ability to organize and use or apply information rather than simply memorizing it.

Review of the Literature

Several researchers have studied whether the way in which objective tests are administered to students affects student achievement on tests in college and university courses. A variety of results can be found in this literature regarding the effect of open book testing on student performance. Most of the related research available concerning open book testing is based on traditional, face-to-face classroom settings.

A few research studies have found that students perform better on open book tests than traditional tests (Francis, 1982; Liu, 2005; diVesta, 1954). For example, Francis (1982) investigated the effect of using open book tests in a university English literature course. Results showed that students earned higher test scores than their peers who completed a traditional examination.

Many more researchers have reported that students perform equally well on open book examinations as they do on traditional examinations (Ioannidou, 1997; Jehu, Pincton, & Cher, 1970; Kalish, 1958; Krarup, Naeraa, & Olsen, 1974; Pauker, 1974; Weber, McBee, & Krebs, 1983). For example, Ioannidou (1997) studied 72 sophomores and juniors enrolled in an undergraduate education course and found no significant difference in overall examination scores between students who took an open book examination than those students who took a traditional test. Pauker (1974) studied student performance in an undergraduate child psychology course and found no significant differences in average student test scores when comparing open book to closed book tests.

Some researchers have found that at least some subgroups of students perform at lower levels on open book tests than those taking traditional, proctored examinations (Francis, 1982; Phillips, 2006). For example, Pauker (1974) found that overall scores were not different between the two groups (traditional and open book examinations), but below average students' scores were significantly lower on open book examinations. Boniface (1985) and Ioannidou (1997) both found that students who devoted more examination time to using notes and texts on an open book test obtained lower scores on the examination. diSibio (1983) found that not only did open book testing fail to promote higher order processing of information compared to a closed book examination, but also the expectation of receiving an open book test actually proved detrimental to such processing. Wellman and Marcinkiewicz (2004) studied 120 college pharmacy students and found that students provided with online, proctored assessment scored better than students who took online unproctored assessments.

These results may be attributed in part to the fact that, in general, students may not prepare adequately for open book tests (Boniface, 1985; Brightwell, Daniel, & Stewart, 2004; Theophilides & Koutselini, 2000; Weber et al., 1983). Students reported they did not invest as much study time or effort into preparation for open book examinations as compared to the amount of time and effort invested in preparation for traditional, closed book, proctored examinations (Clift & Imrie, 1981; Crooks, 1988; diSibio, 1983; Weber et al., 1983).

Open book examinations have been shown to reduce anxiety levels in students as they prepare for and complete tests (Boniface, 1985; Feldhausen, 1961; Feller, 1994; Francis, 1982; Ioannidou 1997; Liska & Simonson, 1991; Theophilides & Dionysiou, 1996), along with the tendency to "cram" at the last minute since the dependency on rote memorization is reduced. Some believe that open book tests result in more comprehensive student preparation and more consistent learning during a course (Theophilides & Dionysiou, 1996; Theophilides & Koutselini, 2000).

The Present Study

Research has demonstrated that a lack of preparation for open book tests exists on the part of some students (Boniface, 1985; Brightwell et al., 2004; Theophilides & Koutselini, 2000; Weber et al., 1983). This phenomenon may be related to the fact that anxiety is reduced when taking open book examinations—perhaps too much—to the point students believe little or no preparation is required in order to perform well on such a test (Boniface, 1985; Feldhausen, 1961; Feller, 1994; Francis, 1982; Ioannidou 1997; Liska & Simonson, 1991; Theophilides & Dionysiou, 1996). Mild anxiety can enhance learning and performance on assessments by focusing learners' attention on specific tasks, such as examinations (Harris, 2006; Peplau, 1971). For some students, open book tests may negate this effect.

This lack of readiness may also be due, in part, to students' lack of understanding concerning the differences between preparation for traditional, proctored tests and preparation for unproctored, open book tests. Students may not understand what strategies are needed to succeed on open book examinations. As a result, they may spend too much time with books and notes during the test period, which limits their ability to successfully complete the test, which, in turn, can result in lower test scores (Boniface, 1985; Ioannidou, 1997; Phillips, 2006).

This study investigated the impact of training in open book test-taking strategies on student performance in online, timed, open book, unproctored test environments. The hypothesis was that students provided with Web-based training in open book testing strategies would score significantly higher than students who are not provided with the training. It was also predicted that there would be no difference in test scores when training materials were not administered immediately before the test.

This research was guided by two primary questions regarding test scores on timed, online, unproctored, open book examinations:

- 1) Is there a difference in midterm examination scores for students who were provided training in open book testing strategies immediately before the midterm and midterm scores for students who were not provided any training?
- 2) Is there a difference in final examination scores for students who were provided training in open book testing strategies only before the midterm examination and final exam scores for students who were not provided any training?

Methodology

The convenience sample consisted of 122 masters-level graduate students enrolled in eight sections of the same online introductory instructional technology course in a teacher education program accredited by the National Council for the Accreditation of Teacher Education (NCATE) at a public, mid-southern university. The control group consisted of 71 students who took online, unproctored, open book examinations in Blackboard, but who did not receive training regarding open book test taking strategies. The experimental group consisted of 51 students who took the same course who were provided Web-based training regarding open book test taking strategies before the midterm examination only.

Participants in both groups completed the same 100 point multiple choice midterm and final examinations based on standardized tests provided by the textbook publisher for the current edition used in the period under investigation (Smaldino, Russell, Heinich, & Molenda, 2005). All examinations were administered through the Blackboard course management system using

an imposed time limit of 90 minutes. The assessment used for this study consisted of a multiple-choice midterm test and a multiple-choice final examination. The assessments used in this study contained both recall and application-level questions. Application-level questions accounted for about one-third of the questions on the midterm examination and about one-fourth of the questions on the final examination.

A practice test was provided which allowed all students to experience the Blackboard test environment. Students in both the control and experimental groups were required to complete the practice test before taking the midterm examination. Web based training materials covering open-book testing strategies were developed based on the review of the literature and provided for the experimental group prior to the midterm examination. These materials can be located on the following Website: <http://www.utm.edu/staff//grakes/750/tutorial>

Information regarding open book test-taking strategies was divided into three major categories in addition to an overview: (1) Organize Your Information, (2) Manage Your Time, and (3) Prepare the Environment. Students in the experimental group were required to review the open book testing tutorial prior to the midterm examination and successfully complete a 21-question quiz over the training material that was available in Blackboard. A score of 100% was required, with students provided the opportunity to take the quiz as many times as necessary to achieve the required score. Students were required to successfully complete the quiz over the training materials from 24 to 72 hours prior to the beginning the exam. No student was allowed to take the midterm examination until this requirement was fulfilled.

Results

Research Question 1: Is there a difference in midterm examination scores for students who were provided training in open book testing strategies immediately before the midterm and midterm scores for students who were not provided any training?

When the tutorial was required before beginning the examination, the experimental group (n=51) scored significantly higher (M=88.4; SD=8.3) than the control group (n=71) that did not complete the tutorial (M=84.8; SD=9.3). The effect size or magnitude of the difference in means was moderate as represented by eta-squared ($\eta^2 = .04$) (Cohen, 1988, Volker, 2005). Results of the Analysis of Variance are presented in Table 1 below.

Table 1
ANOVA results for the midterm examination scores

		SS	Df	MS	F
Midterm	Between Groups	400.0	1	.400.0	5.06*
	Within Groups	9477.4	120	79.1	
	Total	.9877.4	121		

Note. * $p < .05$

Research Question 2: Is there a difference in final examination scores for students who were provided training in open book testing strategies only before the midterm examination and final exam scores for students who were not provided any training?

When the tutorial was completed immediately before the midterm examination but was not completed before the final examination, the experimental group's (n=51) mean final examination score (M=87.0; SD=8.6) was higher than the control group's (n=71) mean final examination score (M=86.4; SD=5.4), but the difference was not significant. Results of the Analysis of Variance are presented in Table 2 below.

Table 2
ANOVA results for the final examination scores

		SS	Df	MS	F
Final	Between Groups	9.9	1	.99	.21
	Within Groups	5761.3	120	48.0	
	Total	5771.2	121		

Discussion

With the increasing use of online courses by colleges and universities, faculty and administrators need to evaluate new roles of faculty and students and the effect of various online teaching practices on student achievement. Examination of a variety of assessment methods is an important part of the process. The availability of online testing environments such as provided through software such as Blackboard, bring questions concerning the effect of these new testing opportunities on student performance.

Scores on the open book examinations in this study were not unusually high. These results provide some indication that unproctored, open book tests were not necessarily easier for students than traditional tests. These results reinforce those of Brightwell et al. (2004) who also concluded that open book tests were not easier than traditional examinations. Faculty preparing examinations for online students should consider open book examinations as a viable assessment alternative that can quiet concerns regarding academic honesty (Olt, 2002) and provide an opportunity to better assess application-level skills (Feller, 1994).

Results from this study indicate that open-book test performance may be adversely affected because students do not necessarily understand the differences in preparation requirements for traditional, proctored examinations and the preparation requirements of unproctored, open book examinations. These findings also indicate that training in open book testing strategies may mitigate the inclination to study less for open book examinations (diSibio, 1983) by providing instruction concerning how to successfully prepare for and complete open

book examinations. With preparation immediately prior to the examination, students in this study performed significantly better than students who did not receive the instruction. The lack of significance effects on final exam scores might indicate that students in this sample may not have enough experience with open book testing for one training experience to make a sufficient, lasting change in test preparation behavior.

The training materials may also have helped students to increase focus on test preparation in an environment that can lessen anxiety to such an extent that test performance is adversely affected (Boniface, 1985; Feldhausen, 1961; Feller, 1994; Francis, 1982; Ioannidou 1997; Liska & Simonson, 1991; Theophilides & Dionysiou, 1996). Such focus may insert some productive, mild anxiety back into the test process for students, resulting in increased scores on the open book tests. (Peplau, 1971).

Future Research

The results of this study indicate that the use of open book testing may be a reasonable alternative or addition to traditional assessment methods, particularly if students understand requirements for test preparation in open book testing environments. As online learning opportunities increase, the need for additional research into effective assessment strategies also increases.

Because convenience sampling was used in this study, the degree to which the participants actually represent the entire population is not known. More research is needed to assess the possibilities for open book testing in the online courses using a larger sample. Few studies are available that compare traditional and online assessments and are longitudinal in nature. Fewer studies regarding online learning and assessment have been conducted using graduate students.

Specifically, future research should explore the use of open book testing for application-level knowledge. It will be increasingly important for online instructors to have a research base on which to make choices about the types of assessments that work best with various course objectives. More investigation of the effects of open book testing on academic honesty issues in online courses will also provide useful insights as online programs continue to expand rapidly.

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