The Impact of Open Book Examinations on Undergraduate Students' Learning: Students' Perspective

أثر امتحانات الكتاب المفتوح على تعلم طلبة الجامعة: وجهة نظر الطلبة

Dr. Abdulsalam D. A. Saif, Assistant professor
Department of Curriculum and Instructions
Faculty of Education, Taiz University, Po.Box: 6202, Taiz, Republic of Yemen
doc_abdulsalam@hotmail.com

Abstract:

This study aims to investigate the impact of open book examinations on the learning habits of undergraduate students. Data were collected from a sample of 408 students in the Faculty of Education at Taiz University. These students were selected from the departments of Chemistry Education, Biology Education, and English Language Education. The instrument of the study was a questionnaire that was conducted in order to ascertain whether students preferred open book examination and the reasons for their preference. The results showed that a high percentage of the participants preferred open book examinations despite being more familiar with closed book examinations. They felt that preparations for open book examinations were less time-consuming and that they required less memorization and left more room for logical thinking. The study also discusses how open book examinations can be used to change students' learning attitudes and make the learning process more active.

Key Words: Open book examinations, Undergraduate students, Preference, Learning

الخلاصة :

تهدف هذه الدراسة لبحث أثر امتحانات الكتاب المفتوح على عادات الـــتعلم لدى طلبة الجامعة. تم جمع البيانات من (408) طالباً وطالبة من طلبة كلية التربية بجامعـــة تعز. هؤلاء الطلبة ينتمون إلى كل من قسم الكيمياء، والبيولوجي، واللغة الانجليزية. أداة الدراسة كانت عبارة عن استبيان تم استخدامه لتحديد ما إذا كان الطلبـــة يفضـــلون امتحانات الكتاب المفتوح وكذلك لمعرفة أسباب ذلك التفضيل. أظهـــرت النتـــائج أن نسبة كبيرة من المشاركين يفضلون امتحانات الكتاب المفتوح بالرغم من تعودهمً علـــى اختبارات الكتاب المغلق. هؤلاء الطلبة يعتقدون أن امتحانات الكتاب المفتوح تستهلك وقت اقل عند الإعداد، وتتطلب تذكر اقل، و تزيد من فرصة التفكير المنطقـــي. كمـــا بينت الدراسة الدور الذي يمكن أن تلعبه امتحانات الكتاب المفتوح في تغيير اتجاهـــات التعلم لدى الطلبة وكذلك جعل عملية التعلم أكثر فاعلية.

Introduction

Depart. A closed book examination represents the main way of student assessment used in all levels of Yemeni education. This type of examination can be easily used to test students' abilities of storing-recall-reproduction, and understanding knowledge as well. When well designed, a closed book examination can also be used to test students' abilities to think and apply their knowledge. However, as we started the 21st century, the goal and the mode of study have to change with the onset of the Information Technology (IT) age. Students no longer have to waste time on memorizing information that can be acquired through several IT means. Given the drive to improve the quality of education and the fact that information is now updated so rapidly, students must now move away from passive reading of prescribed texts to the process of acquiring skills

for lifelong learning. This involves, in part, the ability to think critically and creatively (Han, 1998). Open book examinations, on the other hand, have been touted as an evaluation method that promotes more active learning (Baillie & Toohey, 1997). Therefore, the present study tries to explore the impact of open book examinations on learning of a sample of undergraduate students at Taiz University in Yemen.

Related Research

As early as 1958, Kalish had already pointed out that the open book examination measures different abilities than the closed book examination. On the other hand, the use of open book examinations encourages students to focus on ideas and concepts as well as methods and development, while at the same time, reducing the amount of knowledge which only needs to be remembered for an examination and which will probably not be required thereafter (Bacon, 1969). In the meantime, research has shown that the use of closed book examinations is inappropriate in certain courses when students' high-order abilities have to be assessed (Francis, 1982). This has led several educators to consider the use of alternative assessment approaches in order to achieve the goals of promoting active learning. Examples of these assessment approaches are: open book examinations, take home examinations, essay, oral examinations, and credit assignments.

As mentioned previously, the open book examination represents an assessment tool that promotes more active learning. Reported empirical benefits of open book examinations include the creative use of knowledge gained, "deep" probing of the study material, student self-evaluation of course material mastery, and an

enhanced awareness of the learning process (Baillie & Toohey, 1997; Eilertsen & Valdermo, 2000; Theophilides & Dionysiou, 1996). On the contrary, closed book examinations only serve to demonstrate what students can do with whatever they have been able to memorize (Feller, 1994). The continued use of closed book examinations may encourage students to live in the past rather than the future. According to Ching-yen (1973), open book examinations can enhance problem-solving abilities, improve capacity for analyzing, deepen knowledge, and help to overcome shortcomings of casual readings. Additionally, research evidence suggests that, armed with as many facts as possible, students stand the best chance of utilizing the highest possible levels of critical thinking (Baillie & Toohey, 1997; Wilke, 2003).

Closed book examinations emphasize heavily on low-level skills such as rote memorization, instead of testing high-level skills such as the abilities to reason, conceptualize and solve problems. Hoffman (1996) noted that closed book examinations, require memorization but little original thought, and force students to memorize information rather than understand concepts. Such examinations do not prepare the student for practical, real-life situations. On the other hand, research on open book examinations has shown that they reduce the need to memorize factual information (Francis, 1982). Additionally, open book examinations can be used to differentiate those who truly understand the concepts from those who do not.

The use of a closed book examination only serves to test a student's ability to perform under very restrictive conditions. Once out of the classroom, the student will always have access to

whatever resource materials are needed to solve the problem at hand. In this way, an open-book examination is able to almost completely replicate a real-world situation. Our education goal should therefore shift to focus on what students can accomplish if they are given the information at hand. According to Theophilides & Koutselini (2000) when students prepare for a closed book examination, they tend to postpone study at the end of the semester, focus on assigned texts, and memorize information. But, in the case of open-book examination, students tend to consult various sources and interrelate the information acquired (Theophilides & Koutselini, 2000).

With respect to anxiety of examinations that students confront in classrooms, Theophilides & Dionysiou (1996) & Francis (1982) confirm that open-book examinations reduce examination stress. Moreover, from teachers' point of view, open book tests with problems that cannot be answered by coping from the book can reduce anxiety of tests (Bisse, 1993). For this reason, students prefer open book examination to closed book examination (Ben-Chiam & Zoller, 1997; & Zeidner, 1994).

Regarding the advantages of closed book examinations, Macdonald (2002) reported that undergraduate students believed that the benefits of closed-book examinations were represented in synopsis and motivation. In addition, Moore & Jensen (2007) stated that the students who were given open-book tests in an introductory biology course during the semester earned significantly higher grades on these tests, but significantly lower grades on the closed-book final test, than students who took in-class, closed-book tests throughout the semester. On the other hand, as pointed out by

Moore & Jensen (2007), students who had upcoming open-book tests attended fewer lectures and help sessions and submitted fewer extra-credit assignments (bonus) than students who had upcoming closed-book tests. It is suggested that open-book examinations reduce long-term learning and develop academic behaviors that demonstrate lower levels of academic achievement. (Moore & Jensen, 2007).

Universities in Yemen must review their educational systems and prepare to make the necessary changes in order to meet the needs of the economic and manpower demands of the 21st century. The priority should be given for improving the quality of higher education in Yemen. Efforts must be made to develop students who are not only able to process information analytically but also to think independently and creatively with curriculum contents and modes of assessment.

The present study aims to investigate the impact of open book examinations on undergraduate student learning in the Faculty of Education at Taiz University. In order to better understand the impact, a survey was conducted on a group of students who had just completed a mid-term open book examination.

Objectives

The objectives of this study were to: (1) identify students' preferences of examination mode (open or closed book), (2) determine the reasons for students' preferences of examination mode, and (3) study the impact of open book examinations on students' learning processes throughout the course.

Significance of the study

The findings of the present study can serve as the means to evaluate the contribution of open book examinations in the overall educational experience of the undergraduate student. The impact of open book examinations on students' learning is in some way a research topic which was inadequately explored. Research in this area can help universities ascertain the importance of this examination mode in promoting students' abilities necessary for achieving active learning.

Research Questions

1. What are the students' preferences of examination mode (open or closed book)?
2. Do students' preferences vary with gender, year of study, specialization, course background, and experience?
3. What are the reasons of students' preferences of examination mode?
4. What impacts have open book examinations on students' learning processes?

Methodology

Population and Sampling Procedure

The population of this study comprised 2013 undergraduates students enrolled in an educational course, named, Curricula Analysis in the Faculty of Education at Taiz University, Yemen. A total of 408 were randomly selected as a sample for this study. Of the entire cohort of 408 respondents, 152 were Chemistry

Education, 82 were Biology Education, and 174 were English Language Education. Approximately 68.7 of the respondents were females. This was due to the fact that there are more female students who enroll in education programs every year. High percentage of the respondents was second year (89.2%), and the rest were in third year.

Instrument

The instrument was a survey questionnaire that was conducted after a midterm open book examination. This open book examination was carried out in second semester, 2007. In making a decision on which subjects are suitable for open book examinations, not only must the subject matter of the course be considered but also its goals and objectives. In this regard, the course named curricula analysis, offered to students through the third year of study, would be the perfect choice for an open book examination because the aim of this course is to test the students' understanding. Curricula analysis is an area of learning which tries to involve students in several processes of analysis, comparison, and evaluation.

The format of this test was likewise changed, and the change from closed book to open book examination was not such an abrupt one. However, the format of the questions which were set for the open book examination was different from that of closed book questions. For instance, questions with answers which could be copied from texts or prepared model answers were eliminated. Students were asked to apply their knowledge and skills in solving practical problems and making decisions on the basis of information they have not previously come across in their texts.

The questionnaire was immediately conducted after the mid-semester test, March, 2007. The questionnaire was designed to gather information on the students' backgrounds; their preference of examination modes; their perception of open book examinations and the reason(s) for their preference. The information gathered on the students' background included gender, year of study, specialization, course background and experience. Questions on the student's perception of open book examinations included the level of difficulty and expected grade as well as the number of reference books and their usefulness. For preferences, the students could select from the following categories: (1) less time consumed for preparation, (2) less stress, (3) less memorization, and (4) more room for logical thinking. Lastly, an open-ended question was prepared for respondents who wished to make a comment.

After they responded to the questionnaire questions, students were told that they are going to have a final open book examination. The purpose of having such examination was to study whether open book examinations have an impact on students' learning processes. Exam format was also associated with changes in academic behavior (Moore, 2007). Through the rest of the class meetings of second semester, after the mid-term test, the author of the study did watch and record any changes on students' learning habits.

Data Analysis

Descriptive statistics were calculated for all variables. A series of *t*- tests was used to identify whether there were significant differences among the respondents' perception of the mid-term open book examination. Chi-square analysis was then used to

identify whether there was any co-relation between the respondents' backgrounds and their preferences.

Results

Students' preferences

For the purpose of analysis, the students were grouped according to their preferences. The various distributions of students' preference for open book versus closed book examinations by background information are summarized in Table 1.

Table 1: The distributions of students' preference

Variables	*Open book*	*Closed book*	*No Comment*	*Total*
Gender				
Male	**83 (63.4%)**	**47 (35.9%)**	**1 (0.7%)**	**131 (100%)**
Female	**172 (63.5%)**	**102 (35.4%)**	**3 (1.1%)**	**277 (100%)**
Year of study				
Second year	**226 (62.1%)**	**134 (36.8%)**	**4 (1.1%)**	**364 (100%)**
Third year	**29 (65.9%)**	**15 (34.1%)**	**0 (0.0%)**	**44 (100%)**
Specialization				
Biology	**51 (62.2%)**	**30 (36.6%)**	**1 (1.2%)**	**82 (100%)**
Chemistry	**103 (67.8%)**	**49 (32.2%)**	**0 (0.0%)**	**152 (100%)**
English Language	**101 (58.0%)**	**70 (40.2%)**	**3 (1.8%)**	**174 (100%)**
Course background				
Were exposed to the course materials before	**41 (61.2%)**	**26 (38.8%)**	**0 (0.0%)**	**67 (100%)**
Were not exposed to the course materials before	**214 (62.8%)**	**123 (36.0%)**	**4 (1.2%)**	**341 (100%)**
Experience				
Experienced	**65 (67.0%)**	**31 (32.0%)**	**1 (1.0%)**	**97 (100%)**
No experience	**190 (61.1%)**	**118 (37.9%)**	**3 (1.0%)**	**311 (100%)**
Total	**255 (62.5%)**	**149 (36.5%)**	**4 (1.0%.)**	**408 (100%)**

As shown in Table 1, more than 60% of the respondents preferred open book to closed book examinations. This is regardless of gender, year of study, and course background. A slightly higher percentage of students from the chemistry major

(67.8%) preferred open book examinations as compared to 58.0% of the English language students. More of the respondents who have had previous experience with open book examinations (67%) preferred them to those who did not have such experience (61.1%). Overall, 62.5% of the respondents preferred open to closed book examinations. A z-test performed on the results showed that more than 60% of the respondents preferred open book to closed book examinations at a 2% significance level, P= 0.02.

Chi-square tests were then used to determine whether the students' preferences were significantly related to their backgrounds. The few responses indicating "no comment" were not included in the tests. The results of the tests are shown in Table 2.

Table 2: Students' preference, χ2 values, and significance levels

variables	χ^2	***p***
Gender	**1.313**	**0.723**
Year of study	**1.941**	**0.285**
Specialization	**12.957**	**0.002**
Course background	**1.202**	**0.622**
Experience	**2.921**	**0.079**

The analyses indicated that the respondents' gender, year of study, course background, and experience were not related to their preferences. The only factor which showed a co-relation was the field of study (P-value = 0.004). Proportionately more respondents from the chemistry major preferred open-book examinations compared to those from the English language major (see Table 1).

Students' perception of the open book mid-term examination

Students were asked to rank their perceptions of the mid-term examination on a five-point scale. The difficulty level of the

examination was rated with 1 = denoting very easy, 2 = easy, 3 = average, 4 = difficult, and 5 = very difficult. The expectation of their grades was rated with 1 = denoting excellent, 2 = very good, 3 = good, 4 = fair, and 5 = poor. The number of the reference books the students brought with them for the examination was rated with 1 = denoting none, 2 = one, 3 = two, 4 = three, and 5 = more than three. The usefulness of the reference books was rated with 1 = denoting very helpful, 2 = helpful, 3 = neutral, 4 = not helpful, and 5 = not helpful at all.

A series of t- tests were used to identify whether there were significant differences among the respondents' perceptions of the mid-term examination, according to their preferences. The descriptive statistics and the test results are shown in Table 3.

Table 3: Students' perceptions of the mid-term examination by preferences, t values, and significance levels

Variables	***Open book (n=255)***		***Closed book (n=149)***		***t***	***p***
	Mean	Sd	Mean	Sd		
Difficulty level perceived	**3.213**	**0.569**	**3.928**	**0.621**	**-4.321**	**0.004**
Expectation of grade	**4.108**	**0.842**	**4.095**	**0.883**	**0.051**	**0.775**
Number of books brought for the examination	**2.138**	**0.520**	**2.112**	**0.518**	**1.083**	**0.330**
Usefulness of reference books	**2.695**	**0.839**	**3.692**	**0.841**	**-8.092**	**0.000**

Note: The t- tests were performed assuming variances were equal.

As seen in Table 3, the students' perceptions of the difficulty level of the mid-term examination and the usefulness of the reference book(s) which they have brought for the examination are significantly different for respondents who have different preferences (P-values < 0.05). The mean scores of the students who

preferred closed book examinations showed that they perceived the examination to be more difficult than those who preferred open book examinations. Likewise, the same students found that the reference book(s) brought with them for the examination were not helpful while those who preferred open-book examinations found that the reference book(s) were helpful. Students' expectation of grades and number of books brought for the examination were not significantly different by preferences (P-value > 0.05). In both categories, the mean scores of the expected grades were close to 4.0. This implies that on average, both groups of students expected a fair grade. The mean score for the number of books which the students brought for the examination was close to 2.1, meaning that on average each student brought one reference book for the examination.

Reasons for the preferences

The distributions of the reasons given by the students' mode preferences are summarized in Table 4.

Table 4: Reasons for the Preferences

Reason		*Open book*	*Closed book*	*Total*
Less time-consuming for preparation.				
	Agree	**104**	**7**	**111**
	Disagree	**141**	**142**	**283**
Less stressful				
	Agree	**126**	**62**	**188**
	Disagree	**129**	**87**	**216**
Less memorization				
	Agree	**231**	**5**	**236**
	Disagree	**24**	**144**	**168**

Reason		*Open book*	*Closed book*	*Total*
More room for logical thinking				
	Agree	**49**	**15**	**64**
	Disagree	**206**	**134**	**340**
Total		**255**	**149**	**404**

As seen in Table 5, the results show that reasons which were significantly related to mode preference are: less time-consuming for preparation, less memorization, and more room for logical thinking (P-values < 0.05). The reason "less stressful" is not significantly related to the students' preference (P-values > 0.05).

Table 5: Reasons for preferences, χ2 values, and significance levels

Reason	χ^2	*p*
Less time-consuming for preparation	**92.591**	**0.000**
Less stressful	**0.672**	**0.242**
Less memorization	**397.794**	**0.000**
More room for logical thinking	**7.882**	**0.011**

Students who prefer open book examinations agree that such examinations will reduce the amount of time spent on preparation, make the learning process less stressful, require less memorization, and allow more room for logical thinking. In particular, of those who prefer open book examinations, 90.6% agree that they have less to memorize as against 3.4% who preferred closed-book examinations, 40.8% agreed that it was less time-consuming for preparation as against 4.7% who preferred closed-book examinations.

Other reasons

Besides the four major reasons listed in the questionnaire, students were also asked to indicate other reasons for their preference. Among the 408 respondents, 54 (13.2%) gave various other reasons for their preferences. For the students who preferred open book examination, 31 gave other reasons to support their preference. Most of them agreed that open book examinations could truly examine what they had really learn and enhance their confidence. Furthermore, they could save on time needed to locate the information they required to answer the questions during the examination. For the students who preferred closed book examinations, 23 gave other reasons for supporting their choice. They said that questions in closed book examinations were usually easier, more direct, clearer and closer to the questions in tutorials and textbooks.

Student Learning Processes

Students found that the traditional learning strategies which they had used for closed book examinations would be inappropriate for open book examinations. Students also realized that they have to change their learning processes to develop different abilities for open book examinations. For instance, students used to study for closed book examinations by reviewing past years' examination questions, marking questions that may be repeated. However, all this changed after the open book mid-term examination. The students knew that unless they understood the concepts, they would not be able to pass the final examination. Since then the students' study habits were observed during lectures and tutorials. Two

phenomena were noted: (1) Students were paying more attention during the lectures and making more organized note, and (2) students became more active in discussion during tutorials. They were more prepared to interact with tutors.

The change to open book examinations has made an obvious impact on the learning habits of students. From the second phenomenon, it could be noticed that students adopting an active mode of studying. They started to ask questions, answer questions themselves, solve problems, argue and choose between alternatives, and challenge their teachers. However with this change in the learning habits of students should be met with change in teaching methods as well.

Teaching Methods

Facilitating the shift from closed book to open book examinations needs the use of a more interactive mode of teaching. In the traditional style of teaching, students are passive learners who whether listen to lecturers or take notes. Students usually write down the points made by the lecturer in order to reproduce them in the examination. This method of teaching and tactics used by students could be helpful for a closed book examination, but not for an open book examination. In an open book examination, the focus shifts from the reproduction of information to the processing of information. Open book questions mainly assess a student's abilities rather than his knowledge of course content. These abilities include the ability to apply a theory, test a hypothesis, propose an explanation, interpret the meaning, infer predictions, design an experiment, and so forth. To help students develop such, students

must interact actively with the teacher, instead of merely listening passively.

Discussion and Conclusion

The analysis of the participants' responses shows that more than 60% of the students preferred open book to closed book examinations. This result is consistent with the findings of the previous research (Zeidner, 1994). However, there was no significant difference in the expected grades between those who preferred open book and those who preferred closed book examinations. There were no significant differences in achievement between students who took either open or closed book examinations (Theophilides & Koutselini (2000); Ioannidou (1997).

The analysis also showed that the number of respondents who chose the reasons "less time-consuming for preparation", "less memorization" and "more room for logical thinking" differed significantly according to mode preference. In particular, 90.6% of students who preferred open book examinations agreed that there is less need for memorization in open book examinations; 43.0% agreed that it is less time consuming for preparation but only 19.3% agreed that there is more room for logical thinking. A few students who preferred open book examinations reported that open book examinations examine students on their understanding rather than on their memory. But other few students stated that because of time constraints, it was not possible to refer to books during the examination.

An open book examination represented a new experience for many students of the Faculty of education at Taiz University.

Furthermore, as the type of questions set for the midterm open book test was different from that for closed book examinations, students had to prepare themselves accordingly and did not agree that open book examinations reduced stress. This was so especially for the students who preferred closed book examinations. Most students only brought one reference book with them for the examination and they found that they did not have enough time to locate the needed information for answering the questions. Another phenomenon worthy of note is that the students' learning processes are changing. They know that spotting, preparing and memorizing answers will not work for open book examination. In the meantime, teaching methods should be adjusted to help students move away from rote learning.

In conclusion, more students preferred open book to closed book examinations. Such a positive response towards open book examinations represents a strong support for extending such examinations to other subjects. As was pointed out by Theophilides & Dionysiou (1996), the open book examination system, if properly implemented, promotes the ability to think rather than to memorize; reduces stress for the examinees and encourages students to self-monitor their own learning. Therefore it is so necessary to implement the system appropriately in line with changes in courses, teaching and learning. Using the open book examination system with appropriate changes to teaching methods may represent a significant contribution to improve higher education learning.

References

1. **Bacon, F. (1969).** Open book examinations, *Education and Training*, 11(9), 363-363.
2. **Baillie, C., & Toohey, S., (1997)**. The "power test": its impact on student learning in a material science course for engineering students. *Assessment & Evaluation in Higher Education*, 22(1),33-48.
3. **Ben-Chiam, D.; & Zoller, U., (1997)**. Examination-type preferences of secondary school students and their teachers in the science disciplines, *Instructional Science*, 25(5), 347-367.
4. **Bisse, W. (1993)**. *Math Anxiety Workshop 1993, A Program Developed for the Math Anxious Students at All Levels, but Predominantly at Developmental Levels,* Northern Arizona University, Center for the Excellence in Education.
5. **Ching-yen, Chang (1973)**. Examinations and grading: the system of open-book examination is excellent, *Chinese Education*, 6(2), 93-94.
6. **Eilertsen, T.O., & Valdermo, O., (2000)**. Open-book assessment: a contribution to improved learning, *Studies in Educational Evaluation*, 26(1), 91-103.
7. **Feller, M. (1994)**. Open-book testing and education for the future. *Studies in Educational Evaluation*, 20, 235-238.
8. **Francis, J., (1982)**. A case for open-book examination, *Educational Review*, 4(1), 13-26.
9. **Han, C., (1998)**. Singapore: Review of Educational Events in 1997. *Asia Pacific Journal of Education* 18(1), 88-96.
10. **Hoffman, A. (1996)**. All Tests Should be Open Book. The Internet Herald, January 1996.
    (website: http://www.iherald.com/jan96/blob/openbook.htm.)
11. **Ioannidou, M. K., (1997)**. Testing and life-long learning: Open-book and closed-book examination in a university course. *Studies in Educational Evaluation* 23(2), 131-139.

12. **Macdonald, J. (2002)** "Getting it together and being put on the spot": synopsis, motivation and examination, *Studies in Higher Education*, 27(3), 329-38.
13. **Moore, R.; Jensen, P.A., (2007)**. Do open-book exams impede long-term learning in introductory biology courses? *Journal of College Science Teaching*, 36(7), 46-49.
14. **Zeidner, M., (1994)**. Reactions of students and teachers towards key facets of classroom testing, *School Psychology International*, 15(1), 39-53.
15. **Kalish, R., (1958)**. An experimental evaluation of the open book examination, *Journal of Educational Psychology*, 49(4) 200-204.
16. **Theophilides, C., & Dionysiou, O. (1996)**. The major functions of the open-book examination at the university level: A factor analytic study. *Studies in Educational Evaluation* 22(2), 157-170.
17. **Theophilides, C.; Koutselini, M., (2000)**. Study behavior in the closed-book and the open-book examination: a comparative analysis. *Educational Research and Evaluation: An International Journal on Theory and Practice*, 6(4), 379-393.
18. **Wilke, R.R., (2003)**. The effect of active learning on student characteristics in a human physiology course for nonmajors, *Advance in Physiology Education*, 27(1), 207-233.