Does using computer technology improve students' performance? Evidence from a management accounting course

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Abstract

The debate in using computer technology in teaching for improving students' performance remains uncertain for university instructors. This study provides empirical evidence on the effect of using computer technology in teaching a management accounting course at a state university in Jordan. It develops a base model for predicting students' performance in the course and expands it to incorporate a variable capturing the use of computer technology in presenting the materials of this course to the students. In the base model, students' performance in the mid-semester was found to be a good predictor for performance in the final examination. There was no evidence that the performance in an introductory course or the role of gender may lead to better students' performance in the final examination. In the expanded model, there was evidence that using computer technology in teaching management accounting course improves students' performance in the final examination relative to both the performance in the mid-semester examination and the grade in the introductory accounting course.

Key words: Computer Technology; Student Performance; Management Accounting; Accounting Education; Jordan

1. Introduction

Computer technology has become an integral part of instruction at the university education procedures. Some instructors have enthusiastically adopted technological innovations in their classrooms (Craig and Amernic, 2006), while others have resisted the trend (Stewart, 2001). So, the debate on the importance of using computer technology in developing the educational process remains as uncertain as it is unsettling (Watson *et al.*, 2007), which attract more attention as such technology provides several advantages on traditional education and has the potential to enhance teaching and learning (Amare, 2006). One form of this technology is software that generates slides for presenting course material. While there are several presentation packages on the markets, PowerPoint became most common (Daniels *et al.*, 2007). Because of the controversy about PowerPoint and the increase in its use, some studies have attempted to measure the impact of computer-generated presentations on student performance. Overall, the results have been mixed; in some cases, PowerPoint seems to have no effect on student performance (Rankin and Hoaas, 2001), while others found that it enhances performance (Susskind, 2005), and other studies found it had a negative impact (Sosin *et al.*, 2004). Therefore, one aspect of enhancing student performance in any course is the issue of using and releasing PowerPoint tutorial solutions by instructor and make students' access to PowerPoint presentation.

Therefore, the research question which this study will examine as the decision to provide students with tutorial solutions in PowerPoint form which has a wide range of implications on students' performance and instructors' effective teaching. In this regard, most research studies have been in Western societies and Australia and the results were mixed. Relatively little is known about this issue in developing countries generally and in Jordan specifically. Thus, this study sought to extend previous research on the issue of providing students with tutorial solutions in PowerPoint form and make students' access to this technology, and hopes to fill this gap.
On investigating the research question, this study develops a base model for predicting performance in an accounting course. The base model is tested on a sample of 69 students consisting of test and control groups, who studied management accounting course at undergraduate level at a Jordanian state university. This base model is then repeated to test whether access to tutorial solutions in PowerPoint form has any effect on student performance. Performance in the course is measured by the percentage of marks obtained in the final examination. The remainder of this study is organized as follows; Section 2 provides an overview of the previous research on the importance of using computer technology in accounting university education and performance in accounting courses, Section 3 discusses the methodology, method, and procedures adopted, in Section 4, results are reported and discussed, and Section 5 provides a summary and conclusion and discusses the limitations of the study and provides recommendations for future research.

2. Literature review

2.1 Previous research on the importance of using computer technology in education

The last few years have witnessed a steady increase in computer technology in various aspects of life. Universities were not isolated from such development, as technology enjoys several advantages making it an ideal method to be used in improving the educational process and enhancing it (Goffe and Sosin, 2005; Watson *et al*., 2007). A review of the literature reveals many studies that examined the effect of computer technology by teaching first without PowerPoint in one semester and with PowerPoint in the later semester revealing two opposite opinions on the effect of using information technology on student performance. A number of studies showed no effect on student performance (Ahmed, 1998; Daniels, 1999; Szabo and Hastings, 2000; Rankin and Hoaas, 2001; Daniels *et al.*, 2007). Ahmed (1998) gave one lecture with traditional overhead transparencies as part of a teaching program on drug education at schools, and then gave the same lecture in a later semester using PowerPoint. The student results showed that the scores were higher in the course taught using overhead transparencies than those in the course taught using PowerPoint. This result may be related to the small number of questions concerning the course taught with PowerPoint.

Daniels (1999) taught one semester without PowerPoint and the subsequent semester with PowerPoint and found no effect of using PowerPoint on Grades. Szabo and Hastings (2000) taught the first lectures without PowerPoint in one semester and with PowerPoint in a later semester, and found insignificant differences in scores. This result may be due to the learning styles and learning differences in these two semesters.
Rankin and Hoaas (2001) addressed the question of what effect does the use of PowerPoint presentations have on the students in an introductory economics class. It was found that there is no significant effect in terms of student performance. The authors have not specified how they have used PowerPoint. This may be the reason behind obtaining such result. Daniels *et al*. (2007) examined the impact of PowerPoint on student performance, course evaluations, and student preference in economics courses. PowerPoint was used in one of the two courses and a more traditional method was used in the other. The results showed that PowerPoint did not have an impact on grades but the majority of students expressed a preference of PowerPoint over more traditional teaching methods. This result may be due to including much more details on each PowerPoint slide since they use PowerPoint for the first time in their lectures.

Unlike the previous studies, other studies showed a positive impact of using and releasing PowerPoint on student performance (Wilmoth and Wybraniec, 1998, Lowry, 1999; Mantei, 2000; Susskind, 2005; Amare, 2006; Craig and Amernic, 2006). Wilmoth & Wybraniec (1998) taught sections in one semester without PowerPoint and later taught the same course with PowerPoint and found a positive effect of PowerPoint on final grades. Lowry (1999) taught two courses in one semester without PowerPoint and in the subsequent semester he taught the same two courses with PowerPoint and found that the courses taught with PowerPoint showed higher average test scores than those achieve in the other courses. Mantei (2000) taught sections using a traditional teaching method in one half and using PowerPoint in the other half of the same course and found a statistically significant increase in test scores when he used PowerPoint. Susskind (2005) examined the effect of non-interactive computer assisted instruction on students' performance, self-efficacy, motivation, and attitudes. Half the lectures presented to two introductions to psychology-college classes were taught in a traditional lecture format and half were accompanied by PowerPoint multimedia. Lecture order was counterbalanced across classes. Whereas lecture style did not affect academic performance, students had more positive attitudes about the course and greater self-efficacy with PowerPoint.

In the class that started with PowerPoint lectures, student motivation declined after PowerPoint stopped accompanying lectures. However, student motivation did not increase after PowerPoint was added in the other class.Amare (2006) analyzed the performance and attitudes of technical writing students in PowerPoint enhanced and in non-PowerPoint lectures. Four classes of upper-level undergraduates at a mid-sized, Southern university taking a one-semester technical writing course were surveyed at the beginning and end of the course about their perceptions of PowerPoint. Of the four sections, two were instructed using traditional lecture materials, while the other two were instructed with PowerPoint presentations. All four classes were given the same pre- and post-test to measure performance over the course of the semester. Traditional lecture or PowerPoint presentations consisted of at least 50% of the course, while the remaining time was spent on exercises and small group work. Results reveal that while most students say they preferred PowerPoint, performance scores were higher in the sections with the traditional lecture format. Craig and Amernic (2006) present an article to stimulate beneficial conversations about a prevalent educational software technology. They present a wide-ranging analysis of the use of PowerPoint technology in higher education, and addressed four overlapping issues; has PowerPoint led to more effective learning?

What impact has PowerPoint had on the dynamics of classrooms? What are some important aspects of the culture that accompanies PowerPoint? And how has PowerPoint affected orality, visuality and literacy? They found that PowerPoint is having a profound effect on higher education and recommend that all users of PowerPoint should respond to Postman's (1993) call and pause to reflect about any new technology, such as PowerPoint, and how it affects their engagement with what and how they teach and should engage in conversations and critique of new technology, rather than to accept them blindly and unquestioningly.

2.2 Previous research on the importance of using computer technology in accounting courses

Accounting educators increasingly use web-based materials in their classrooms and conducted empirical as well as descriptive research regarding the use of computer technology, which continues to be important in accounting courses and identifies several factors that determine success in accounting courses. Results, still, show two opposite opinions on the effect of using information technology on student performance. Abdolmohammadi *et al.* (2003) used the implementation and evaluation of a web-assisted financial statement analysis course to determine whether students perceived that using the website both in and out of class enhanced learning. The survey results indicated a median student response of "agree" on a five-point scale to several items related to the use of web-based teaching in helping the students' learning process. Student responses indicated that they did not find the course website to be particularly helpful, and they did not use it extensively. This result may be attributed to the substantial revisions of the course and not to the use of the web.

Halabi *et al*. (2005) compared the worked examples and problem-solving exercises approaches to learning a highly-structured introductory accounting topic using computer-based learning (CBL) materials. The results show that worked examples were more efficient than problem-solving exercises for students who had no prior knowledge of accounting and there was no difference in performance for subjects using worked examples versus problem-solving exercises. This result may have been obtained so due to the instructional approach used by the researchers.

Siam and Rahahleh (2005) studied the effect of using information technology in accounting university education and found that accounting teaching staff members do recognize the importance of using information technology in accounting university education. They, also, found that the actual use of information technology in accounting university education is still limited in Jordan due to obstacles related to teaching staff members and students, technical potentials and available financial resources. They recommended that the use of information technology in education has many advantages that supports quality assurance of accounting university education and increases its effectiveness.

Nouri and Clinton (2005) investigated how accounting students' attitudes toward class presentation and the instructor were affected by three independent variables and their interactions: gender, presentation mode, and use of mental imagery. Regression revealed that students in the PowerPoint class who use better mental imagery reported higher preparedness scores for the instructor. In a related study, Nouri and Shahid (2005) investigated the effect of using PowerPoint in lectures on students' attitude. They found those who use mental imagery did better in quizzes if they were in the PowerPoint group. Stanley and Edwards (2005) developed an interactive, multimedia CD for use in a computerized accounting systems and auditing class at Queensland University of Technology. They reported the results of student evaluations of teaching and of focus groups, concluding that students benefited from the use of the CD.

Barsky and Catanach (2005) suggested an alternative method, which employs a business-planning model (BPM) for teaching the introductory management accounting course. The result of survey of professionals and of students who took the BPM course and those who took a non-BPM management accounting course was presented. Students' responses indicated that the BPM class met its goals, and professional feedback was favorable as well. Beaman *et al.* (2005) examined the effect of training in financial modeling on students' ability to build financial models using spreadsheets. They concluded that both topical training (i.e., financial modeling) and technical training (i.e., spreadsheets) were necessary.

Rainsbury and Malcolm (2003) investigated the use of a discussion board in an intermediate accounting course. The results showed that discussion board use contributed positively to students' perception of increased learning. deLange *et al*. (2003) surveyed 292 on-campus undergraduate students enrolled in an introductory accounting class regarding the use of WebCT. The results showed that student satisfaction with virtual learning environment was significantly associated with providing lecture notes online, use of a bulletin board, online assessment, and other tools such as chat or video. Marriott *et al.* (2004) studied the use of information and communications technology (ICT) by undergraduate accounting students at two UK universities and their views regarding Internet use in their programs.

The results showed a significant increase in Internet and email usage over the period of the study; use of ICT differed depending on the institution studied; and males reported higher word processing, spreadsheet, general ledger, and overall computer use. Previous research on student performance in accounting courses has identified several factors that determine success in accounting courses and sensitize to the use of computer technology in teaching accounting courses, while only a few studies examine the relation between the issue of providing students with tutorial solutions in PowerPoint form on students' performance in an accounting course (Haugland, 1997; Monem, 2007).

Haugland (1997) examined two accounting courses where computer instructional technology was used to present course material to students. Microsoft PowerPoint and Word were selected to present materials in the classroom, and course web pages were developed to make PowerPoint slides accessible to the students. This study describes the procedures used by the professor, observations of the professor and the reactions of students enrolled in the two courses. The results indicate the use of computer instructional technology and course web pages enhance student's learning, students are more motivated to attend and participate in class, students' retention of information is increased, students are able to integrate information, concepts and course materials, leading to a greater understanding of class content and ultimately improved grades, and students gain confidence in utilizing these resources themselves, which enables them to make more effective and professional presentations in the future.

Monem (2007) provides empirical evidence on the effect of releasing tutorial solutions in a management accounting course at a large Australian university by developing a base model for predicting performance in the course and expanding the model to incorporate a variable capturing the release of tutorial solutions. The results, in the base model, indicated that performance in an introductory accounting course and the mid-semester test were found to be good predictors of performance in the final examination. Evidence on the role of gender and age was weak. In the expanded model there was no evidence that releasing tutorial solutions improved performance in the final examination. Therefore, the hypothesis that releasing tutorial solutions improves student performance is not supported. On the contrary, the balance of evidence suggests that performance in the course might suffer because of 'false complacency'.

3. Methodology, method, and procedures

The lectures adopted of computer technology (e.g. providing students with tutorial solutions in PowerPoint form) provide the appropriate forum for a two-way communication between the instructor and students where questions on the examination may largely follow the format of tutorial questions. In such an environment, students would be keen to access PowerPoint tutorial solutions. However, there are arguments both for and against releasing tutorial solutions (Monem, 2007). So, the argument in this study is that, if students are given access to PowerPoint tutorial solutions would this facilitate student learning and enhance student performance in the course? Therefore, the proposition that is tested in this study is whether providing students with tutorial solutions in PowerPoint form do improve student performance in the management accounting course. The hypothesis is stated as follows:

H_1: Providing students with tutorial solutions in PowerPoint form leads to better student performance in management accounting course.

The study is focused on a management accounting course, which includes cost concepts, cost behavior, cost-volume-profit analysis, job costing, process costing, activity-based costing and management, and master budget and responsibility accounting at undergraduate level in the first and second semesters of 2010 in a Jordanian state university. The course was built on 16 weeks with 3 hours a week of lectures and tutorials. Tutorial questions were set to demonstrate the practical applications of the concepts discussed during the lecture.

The study used the first semester class of (43) students as a control group of which (3) did not sit for the final examination and were excluded from the sample. Therefore, the final sample had (40) students in the control group. The second semester class of (30) students was used as a test group of which one student did not sit the final examination and was excluded from the sample. Therefore, the final sample had (29) students in the test group. The change in the method of teaching the course took place complying with institution's policy to shift to new method of teaching business courses by using computer technology. Being the tutor of this course in the time of the shift in the method of teaching motivated me to conduct this study with the objective of looking at the impact of implementing the new method on student performance. The control and the test groups were compared in terms of their performance in the final examination. Data on all the variables were collected from the university records. For the test group, detailed PowerPoint tutorial solutions were released on a week-by-week basis, and detailed to the level that was required by students.

The control group studied the same syllabus and received tutorial solutions in a paper form, used the same textbook, had the same instructor, and had similar assessment schemes as the test group. In addition, the final examinations were vetted by a moderator. All these factors contributed to creating the best possible conditions for the basis of comparison of performance between the two groups. For this purpose, this study develops a base model based on previous literature (Rankin and Hoaas, 2001; Drennan and Rohde, 2002; Monem, 2007) for predicting performance in the course and expands the model to incorporate a variable capturing the release of PowerPoint tutorial solutions. The following base model is proposed for predicting performance of students in the management accounting course:

$$FINALi = B_0 + B_1\ INTROi + B_2\ MIDi + B_3\ GENDER\ i + Ei \quad (1)$$

where FINALi is the percentage of marks obtained by student i in the final examination; INTROi the grade obtained by student i for the introductory accounting course as a specific ability in accounting courses; MIDi the percentage of marks obtained by student i in the mid-semester examination as a specific ability in the course; GENDER i a dummy variable that takes a value of 1 for male students and 2 for female students; and *E*i the error term. The variables INTROi and MIDi are expected to have positive coefficients, whereas the direction is not clear for the coefficient of GENDER i. In testing whether access to PowerPoint tutorial solution has any positive effect on student performance in the final examination, model 1 is expanded as follows:

$$FINALi = B_0 + B_1\ INTROi + B_2\ MIDi + B_3\ GENDER\ i + B_4\ RELEASEi + B_5\ RELEASEi\ *INTRO + B_6\ RELEASEi\ *MID + B_7\ RELEASEi\ *GENDER + Ei \quad (2)$$

where RELEASEi is a dummy variable introduced for testing Hypothesis 1 and takes a value of one for the test group and zero for the control group; RELEASEi *INTRO, RELEASEi *MID, and RELEASEi *GENDER are all interaction variables incorporated to see whether the test and the control groups differ systematically in terms of performance in the mid-semester and introductory accounting course. Model 2 is estimated on the total sample combining the test and control group samples of (69) students where the predicted sign for the variable RELEASE is positive.

4. Results and discussion

4.1 Descriptive statistics for the variables

The descriptive statistics for the variables in the study is shown in Table 1. As Panel A of Table 1 shows, the mean (median) score for the test sample in the mid-semester examination is 73.51 per cent (80.00 per cent) compared to 80.20 per cent (80.00 per cent) in the final examination, which means that students in the test group performed better in the final examination than in their mid-semester examination. Panel B of Table 1 shows, the mean (median) score for the control sample in the mid-semester examination is 70.80 per cent (68.00 per cent) compared to 69.00 per cent (72.00 per cent) in the final examination, which means that in the control group, student performance in the mid-semester examination was better than that in the final examination.

Insert table (1) about here

Also, the mean score for the test group (and the control group) in the introductory accounting course is 68.82 per cent (73.80 per cent), which means that students in the test group have lower grade in the introductory accounting course but they did better in the final exam from those students in the control group. This supports the study hypothesis that using and releasing PowerPoint tutorial solutions enhances student performance in the management accounting course. Furthermore, the mean score for gender composition for the test and control groups is 1.37 and 1.52, respectively, which suggests that female students do better than male students.

4.2 Univariate tests

Table 2 reports the results of the independent samples t-test, the Mann-Whitney U-test, and the Kolmogorov-Smirnov Z-test on the differences between the test group and the control group. Although the two groups do not differ in terms of their performance in the introductory accounting course as a specific ability in accounting courses (t-statistic = -1.740) and the mid- semester examination as a specific ability in the course (t-statistic = 0.774), they differ significantly in terms of their performance in the final examination (t-statistic = 3.620, p = 0.001).

Insert table (2) about here

4.3 Regression analysis

Table 3 shows that the variables MID (r = 0.371, p = 0.002) and RELEASE (r = 0.405, p = 0.001) are significantly positively correlated to the dependent variable FINAL.

Insert table (3) about here

Table 4 reports the ordinary least squares regression estimates of models 1 and 2 on the total group of 69 students. Overall, models 1 and 2 explain 38.0 per cent and 53.0 per cent of the variability in the dependent variable, respectively. This result is approximately close to the corresponding results obtained in some other studies that investigated student performance in accounting courses (e.g. Monem, 2007), 40.36 and 53.61 per cent. This compares favourably against some other studies that investigated student performance in accounting courses (e.g. Rohde & Kavanagh, 1996), 28 and 28.7 per cent; Hartnett et al. (2004), 36.1 and 41.8 per cent. In both models, as shown in Table 3, the variable MID (t-statistics = 3.229 in model 1, 2.810 in model 2) has the predicted positive sign and is statistically significant with a p-value of 0.002 and 0.007, respectively. The variables INTRO and GENDER are insignificant in both models. The variable release for testing Hypothesis 1 (t-statistic = 3.478; p = 0.001) has the predicted positive sign and is statistically significant. Therefore, using and releasing PowerPoint tutorial solutions to students appears to have a positive impact on student performance in the final examination. All the three interaction variables have insignificant t-statistics. This illustrates that the test and control groups do not differ statistically from each other in terms of performance in the mid-semester examination, introduction, and gender.

Insert table (4) about here

Diagnostic tests were undertaken for multicollinearity, heteroscedacity, and first-order serial correlation to ensure that the key assumptions underlying the linear regression model were not violated by the data. The estimated Durbin-Watson statistics of 1.865 in model 1 (2.159 in model 2) suggests that first-order serial correlation in error terms is unlikely to be a serious threat. The multicollinearity test using Tolerance and VIF suggests that the variable MID has 0.789 (1.268) and variable INTRO has 0.748 (1.337), respectively. Therefore, multicollinearity does not appear to be a serious problem in the data.

5. Summary and conclusion

Research regarding the use of computer technology continues to be important because of the pace at which technology is being incorporated into the accounting teaching process. Many business schools have invested substantial resources into web-based packages to offer online courses or enhance regular face-to-face classes. But the debate of using computer technology for developing student performance remains uncertain for university instructors (Watson *et al.*, 2007; Zemsky and Massy, 2004). This paper empirically tests the issue on whether using and releasing PowerPoint tutorial solutions does improve student performance by using a test and control groups of students in a management accounting course at a state university in Jordan. The study provides evidence that using and releasing PowerPoint tutorial solutions does improve student performance in the final examination relative to performance in the mid-semester examination and the grade in the introductory accounting course.

Unlike some of the previous studies that showed no impact of releasing PowerPoint presentation on student performance (Rankin and Hoaas, 2001; Abdolmohammadi *et al.*, 2003; Amare, 2006; Daniel *et al.*, 2007; Monem, 2007), this study showed a positive impact of providing students with tutorial solutions in PowerPoint form on student performance in a management accounting course at a state university in Jordan that goes in parallel with plenty of previous studies (Haugland, 1997; Lowry, 1999; Mantei, 2000; Nouri and Shahid, 2005). As a practical issue, the positive impact of providing students with tutorial solutions in PowerPoint form on student performance in the management accounting course seen by this study should encourage accounting lecturers to make tutorial solutions in PowerPoint form available to students. Although some of the key factors that affect student performance are considered in this study, others, that may be as influential, have been excluded such as age and experience of tutors. Also, it would be interesting to determine whether the publishers' PowerPoint slides are more effective than the instructors' developed materials. All these factors offer potential avenues for future research that would enhance the external validity of this study.

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Table 1: Descriptive statistics for the variables

Panel A: Test Group (N = 29)

		Final	Mid	Intro	Gender
Mean		80.20	73.51	68.82	1.37
Median		80.00	80.00	72.00	1.00
Std. Deviation		8.788	1.206	1.323	.493
Percentiles	25	74.00	64.00	60.00	1.00
	75	88.00	80.00	78.00	2.00

Panel B: Control Group (N = 40)

		Final	Mid	Intro	Gender
Mean		69.00	70.80	73.80	1.52
Median		72.00	68.00	74.00	2.00
Std. Deviation		1.498	1.585	1.048	.505
Percentiles	25	58.50	60.00	68.00	1.00
	75	78.00	84.00	80.00	2.00

Table 2: Results of independent samples t-test, Mann-Whitney U-test, and Kolmogorov- Smirnov Z-test: test group versus control group

	t-statistic	Significance (two-tailed)	Z-statistic	Asymptotic Significance (two-tailed)	Kolmogorov – Smirnov Z	Significance (two-tailed)
FINAL	3.620	0.001	-3.333	0.001	1.523	0.019
MID	0.774	0.442	-0.764	0.445	0.958	0.318
INTRO	-1.740	0.086	-1.371	0.170	0.778	0.581
GENDER	-1.193	0.237	-1.189	0.234	0.597	0.868

Table 3 : Pearson's bivariate correlation matrix

	FINAL	MID	INTRO	GENDER
MID	0.371** (0.002)			
INTRO	0.079 (0.520)	0.396** (0.001)		
GENDER	-0.016 (0.895)	-0.094 (0.442)	0.180 (0.138)	
RELEASE	0.405** (0.001)	0.094 (0.442)	-0.208 (0.086	-0.144 (0.237)

**Correlation is significant at the 0.01 level (2-tailed), N = 69

Table 4: Ordinary least-squares regression estimates of models 1 and 2 on the full group of 69 students

	Expected sign	Standardized coefficient (t-statistic; p-value)	
		Model 1	Model 2
Intercept	?	- (4.493; 0.000)	- (3.862; 0.000)
MID	+	0.410 (3.229; 0.002)	0.335 (2.810; 0.007)
INTRO	+	-0.091 (-0.705; 0.484)	0.014 (0.113; 0.910)
GENDER	?	0.039 (0.327; 0.745)	0.069 (0.623; 0.535)
RELEASE	+		0.386 (3.478; 0.001)
RELEASE*MID	+		-0.134 (-0.180; 0.858)
RELEASE*INTRO	+		-0.301 (-0.391; 0.697)
RELEASE*GENDER	?		-0.377 (-1.095; 0.278)
F-Statistics (p-value)		3.657 (0.017)	6.235 (0.000)
Adjusted R^2 (%)		38	53
Durbin-Watson statistics		1.865	2.159

ملخص البحث في اللغه العربيه

ما زال النقاش غامضاً بين مدرسي الجامعات حول مدى فائدة استخدام تكنولوجيا الحاسوب في التعليم الجامعي من اجل تحسين أداء الطلبة.

فتقدم هذه الدراسة أدلة تجريبية حول تأثير استخدام تكنولوجيا الحاسوب في تعليم مساق المحاسبة الإدارية بجامعة حكومية في الأردن، حيث تم تطوير معادلة أساس للتنبؤ بأداء الطلبة في المساق الدراسي بحيث شملت متغير استخدام تكنولوجيا الحاسوب في عملية تقديم وتوفير المادة الدراسية للطلبة.

فوجد في معادلة الأساس أن أداء الطلبة في الامتحان الفصلي مؤشر جيد على أدائهم بالامتحان النهائي ولم يوجد أي دليل على أن أدائهم في المساق الأساسي أو جنس الطالب قد أديا إلى أداء أفضل في الامتحان النهائي، في حين وجد في المعادلة المطورة بأن هناك دليل على أن استخدام تكنولوجيا الحاسوب في تعليم مساق المحاسبة الإدارية قد حسن من أداء الطلبة في الامتحان النهائي قياساً مع أدائهم في الامتحانات الفصلية أو معدلاتهم في مساق المحاسبة الأساسي .