Impact Of Course Length and Homework Assignments on Student Performance

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ABSTRACT. Because the training of students in critical thinking, analytic skills, and problem solving has become a top education priority in recent years, this study investigates the effects of span of classroom contact and homework completed on students' performance in a management accounting course. Three measures of a student's performance were investigated: the total points earned on all four exams, total points earned on exam multiple-choice questions, and total points earned on exam problems. After controlling for intelligence, sex, and major, this study found a significant main effect for class length when the total exam points earned and the points earned on exam problems were analyzed. However, this main effect was no longer significant when the points earned on multiple-choice questions were examined. As expected, there were significant main effects for intelligence and major across all three performance measures.

The content of accounting education is undergoing a revolutionary transformation, and the traditional methods of accounting instruction are being questioned. Many universities are currently experiencing resource reductions at the same time that faculty are being criticized for various deficiencies in the curriculum. The Accounting Education Change Commission, established by the accounting profession, has also increased interest in classroom teaching. Thus, many faculty members, asked to use their own creativity and innovation, are searching for ways to improve student performance by understanding the factors that are associated with effective learning.

Motivation

The accounting profession wants professionals with creative problem-solving skills who can work successfully with diverse and unstructured problems in unfamiliar settings. Accounting professors are reminded that their programs have a unique opportunity to attract the best and brightest students because elementary accounting is one of the first business courses in which most students enroll. However, graduates who can pass a multiple-choice CPA exam have been the focus of many accounting programs.

Gabriel and Hirsch (1992) stated that bright students will be more motivated to select accounting if they are exposed to a variety of assignments. They described issues associated with implementing an integrated approach to critical thinking and communication skills within accounting courses, arguing that students should experience both oral and written work because, as professionals, they are expected to have both abilities.

Along with the increased concern for course content, instructors have been questioning their grading techniques. Weinstein (1994) found two disturbing weaknesses in the commonly used method of assigning final grades to students. He described a method for ranking students through standardized scores that can result in different individual rankings in comparison with weighted total points. His study also advanced the argument that instructors should allow their professional judgment to have a major influence on the grades they assign.

Factors Associated With Student Performance

As accounting pedagogy undergoes dramatic changes, instructors are asking what steps they can take to improve the learning experience. Despite increased attention to teaching effectiveness, many students continue to fail the management accounting and accounting principles courses or receive less than a C grade. Thus, identification of factors associated with students' performance is essential. Research conducted by Eckel and Johnson (1983), Hicks and Richardson (1984), and Ingram and Petersen (1987) suggests that past grades and grade point average (GPA) are positively associated with future student perfor-

mance. Eskew and Faley (1988) found that the academic aptitude and effort variables included in their multiple regression model account for the majority of their model's explanatory power. They also found that taking bookkeeping in high school and students' cumulative college GPA are also significant predictors of performance.

Doran, Bouillon, and Smith (1991) used a multiple regression methodology to access the relative importance of various factors in predicting student performance in the first two accounting principles courses. Measures of academic performance and aptitude were found to be the most important determinants of examination performance in both Accounting Principles I and II. They found no indication that instructor gender affects student performance.

Instructors are also studying the effects of more frequent testing on student performance. Murphy and Stanga (1994) compared two sections of introductory income tax that were given six periodic exams prior to a cumulative final with two sections of introductory income tax that were given three periodic exams prior to a cumulative final. The group taking more frequent exams had a higher mean performance on the cumulative final exam, although the difference was not statistically significant.

Time Allocated to School Work

Often, accounting professors collect homework assignments because they believe it motivates students to study and improves their exam scores. Farrelly and Hudson (1985) found that students in their study agreed with these observations. Their survey of student preferences about teaching techniques in introductory accounting showed that giving numerous tests and collecting/grading homework were two of the more popular techniques. Students also preferred that much of their class time be used in reviewing homework assignments and tests.

Despite student preferences, a review of accounting literature reveals limited research about the effects of course length and homework completion. Baldwin, Wasson, and Howe (1978) investigated whether collecting and grading homework assignments improves student comprehension of accounting concepts and procedures in introductory accounting courses. Mixed results were obtained from their study, which compared three classes that had their homework collected and graded with three classes that did not.

Vruwink and Otto (1987) also studied the effect of accounting homework collection and quizzes on exam scores. They had four different conditions: (a) no quizzes or homework collection, (b) random homework collection, (c) daily homework collection, and (d) quizzes. Their results did not provide evidence that collecting/grading accounting homework assignments and giving quizzes have an effect on students' exam scores. However, the time period of each treatment was only one fourth of the semester. Vruwink and Otto suggested a longer time period might have yielded different results because students would have had more time to adjust to the different teaching techniques.

Idson and Clark (1991) examined the relationship between academic ability and student allocation of time to school work, market work, and "leisure" activities. They viewed students as having a tripartite choice in the allocation of their time while in school: (a) allocation to studies, (b) allocation to market work, and (c) a residual category considered as leisure time. Students with greater academic capacity have a greater ability to transform their time into knowledge. These students essentially face a lower time price of grades and a higher opportunity cost of leisure and market work than do less academically capable students. Idson and Clark hypothesized that as with the standard labor supply problem, this lower price will produce both substitution and income effects, the former encouraging time at school work and the latter skewing time toward market work and/or leisure activities.

Using SAT and ACT scores to proxy academic ability, Idson and Clark found that samples of students with greater scholastic ability at two universities allocated significantly more time to studies and significantly less time to leisure activities, even after controlling for potential market returns, parental income, and student monetary investment in their college degree. For example, they found a 100-point increase in SAT scores would yield an average increase in study hours of 1.6 per week, and an average decrease in time allocated to leisure activities of approximately 2 hours per week. Their test results were generally supportive of a view of student time allocation behavior as responding to relative prices. They found that students with greater scholastic aptitude allocated greater amounts of time to studies and to market work, while consuming lower amounts of leisure. Their results indicate the existence of a dominant substitution effect in time allocation with respect to the time price of grades.

However, Ravenscroft and Buckless (1992) found that student gender and homework percentage interactively affected performance. They found that grading policies can result in systematic gender effects on course grades. Males in their study received higher final exam scores and course grades when no credit was given for homework. Females, however, received higher course grades at universities when homework determined 11% of the course grade, despite receiving final exam scores comparable to those of males.

Prior Research on Gender Differences in Expectations

The results from the current body of literature on gender differences in success expectations and actual relative performance is mixed. Vollmer (1984) asked psychology students to estimate their exam grades when examining their expectations. Also, students were given an instrument designed to measure various personality traits. Under both circumstances, females were found to have significantly lower expectations than males although no gender differences in actual grades were found. Hesse-Biber (1985) examined differences in male and female perceptions/experiences regarding the academic environment and career goals. Even though the mean grades of females and males were identical, females exhibited greater levels of anxiety about their ability to function in an academic environment. Hesse-Biber found that females were less likely to

question their instructors or to participate in class discussions.

However, Gigliotti and Secrest (1988) found no significant gender differences for expectations or test performance after controlling for familiarity and the perceived relevance and/or usefulness of the course. They measured the expectations of college students in introductory sociology classes on these three dimensions: expected grade, expected lecture difficulty, and expected textbook difficulty. McMahan (1982) and Vollmer (1986) reported similar results. Further, Gigliotti and Secrest's study lends support to the idea that task familiarity and perceived relevance and/or usefulness of the course may account for differences in success expectations, rather than gender differences.

Carpenter, Friar, and Lipe (1993) studied the effects of race, gender, and expectations as they relate to the performance of students in an introductory accounting course in three different institutional settings. They found that females had lower performance expectations than males for this course, but performed at equal levels to their male counterparts and had similar attrition rates.

Though the preceding studies report mixed findings, the results suggest that females may have lower success expectations than males. To develop appropriate intervention strategies, it is important to determine whether female accounting students actually perform at lower levels.

Current Study

The previous studies support the importance of instructors knowing the factors that affect student's learning of accounting. This study investigated factors that affect how well students learn the material covered in a management accounting class. The two factors considered are length of classroom time and homework completion. This research studied students' learning under two situations: one in which the class only met for 8 weeks, the other in which the class met for 16 weeks. Each group experienced the same total minutes of instruction; however, for simplicity, the 8-week class is referred to as the short class and the 16-week class as the long class. This study hypothesizes that students in a class that meets more intensively over a shorter time, but that covers the same material, do not learn to solve complicated problems. Rather, these students would learn only the basic rules of management accounting and how to apply these rules to simple multiple-choice questions. Students in the "long" class are hypothesized to be able to apply rules in decisionmaking and solve complicated problems.

However, if there is no difference in the performance between the two classes as a result of length of learning period, then shortening the span of class meetings is appropriate. There is concern that students can learn only a limited amount of material in a given time period. We believe that grasping the knowledge to solve more complicated and longer problems takes longer. Thus, though the study predicts that students in the two class lengths will perform equally well on short multiple-choice questions, we predicted that students in the short class would be at a disadvantage when asked to solve more complicated problems. In their professional careers, it is likely that students will encounter these types of problems instead of issues in which a simple accounting rule is applied. If this prediction is supported in the study's sample, then accounting administrators should seriously consider the disadvantages of shortening the span of classes and intensifying the class time.

Another factor investigated in this study is the effectiveness of homework assignments. If the assigned homework properly reflects the topics and types of problems that students need to master, and if students consistently complete their homework assignments, then increased learning of accounting should occur. The theoretical model for this study was adapted from Porter and Lawler (1968) and their contribution to the development of expectancy theory. This is the same model used by Vruwink and Otto (1987). Basically, Porter and Lawler stated that an individual's job performance depends on (a) the amount of effort expended by an individual, (b) his or her abilities and traits, and (c) role perception regarding his or her work. A student's effort in the classroom is the energy expended to complete the assignments. A student's preference for a potential grade (value of reward) and his or her perception of the probability that an increased amount of effort will lead to the desired grade (perceived effort-reward probability) are the two influences on the amount of effort expended. We agree with Vruwink and Otto (1987) that an instructor's teaching techniques may influence a student's perceived effort-reward probability and lead to increased effort. For example, random homework collection could increase the total amount of time that a student spends working on the assigned problems and thinking about the related accounting concepts before an exam.

Thus, the study predicted that in both class lengths, students who consistently complete their homework assignments will learn the topic better than those who do not. Support for this hypothesis would indicate that professors should carefully select homework assignments and encourage its completion to maximize the students' learning. The next section outlines the hypotheses tested and methodology used in this study followed by the findings. The final section contains the conclusions.

Hypotheses and Method

Formally, the hypotheses tested in this study were:

Ha1: Students in the short class will earn fewer total examination points than students in the long classes.

Ha2: Students in the short class will earn fewer points on exam problems than students in the long classes.

Ha3: Accounting majors will earn more total exam points, points on exam problems, and points on multiple-choice questions than nonaccounting majors.

Ha4: Students having high past achievement earn more total exam points, points on exam problems, and points on multiple-choice questions than students having low past achievement.

The null hypothesis for the above predictions is no difference between the two groups. The study does not make any prediction for gender, but it does control for this factor in the analysis of variance (ANOVA) tests. As outlined above, we believe that the difference in

performance between the long and short classes is due to differences in solving exam problems. Therefore, a significant difference due to class length for points earned on multiple-choice questions is not predicted.

These four hypotheses were tested through ANOVA. Specifically, three separate ANOVA analyses were run using three specifications of the dependent variable: total points earned on exams, points earned on exam problems, and points earned on exam multiple-choice questions. In each ANOVA, four factors were used: class, gender, major, and past achievement. Each factor took on two levels (see below). Second-order interactions were included in the model; higher-order interactions were ignored. Because of possible correlation between the three dependent variables, MANOVA techniques were also used.[1]

For each class, the difference in performance for students completing homework and students not completing homework was analyzed. The hypothesis tested was

> Ha5: Students completing homework earned more total exam points, points on exam problems, and points on exam multiple-choice questions than students not completing homework assignments.

This hypothesis was tested by performing a t test for differences in the means between the two groups of students for each of the three measures of performance.

One hundred twelve undergraduate students took the introductory management accounting class during the fall semester at a mid-South university. At this university, management accounting is the second accounting course; financial accounting is the first accounting course. Business majors and accounting majors take these courses together in small lecture sections ranging from 25 to 40 students.

The students took either a 16-week or an 8-week class; both the "long" and "short" classes covered the same material and used the same textbook. There was one section of the short class (29 students) and four sections of the long class (83 students). The short class was taught in a concentrated manner using an 8-week period consisting of two 150-minute sessions per week. The other four sections of management accounting were taught in a traditional 16-week semester consisting of either two classes of 75 minutes or three classes of 50 minutes per week. The lecture method was the primary source of instruction in all sections.

Data were obtained for each student on gender (male or female), major (accounting or nonaccounting), and past achievement (high or low). Researchers obtained two proxies from each student's transcripts to classify students as high or low past achievement: actual cumulative grade point average (GPA) and actual score on their ACT college entrance exam. Students with a GPA of 2.7 or higher on a 4.0 scale were coded as being of high achievement in this study, and those students with a grade-point average of less than 2.7 were coded as being of low achievement. Similarly, students with an ACT score of 20 or higher were coded as being of high achievement in this study, and those with an ACT score of less than 20 were coded as being of low achievement. The findings are reported using GPA as the proxy for past achievement; the findings were qualitatively similar to those reported if ACT score is used.[2]

Students in each class were administered four exams comprising multiple-choice questions and problems. Multiple-choice questions were both conceptual and computational. The fourth exam consisted of a comprehensive section and a section over the last chapters covered that had not been tested. Students took the exams under controlled conditions; all students had the same time to complete the exams. All exams for the four long sections were identical. Multiple-choice questions were rearranged, and problem data were changed on exams for the short section.[3] The dependent measures for each student equal the sum over all four exams of the total points earned, total points earned on exam multiple-choice questions, and total points earned on exam problems.

As a homework assignment, students were assigned computerized multiple-choice questions and spreadsheet problems to complete. For the multiple-choice questions, the number of questions completed and the time spent working the homework were recorded for each student. Students self-reported time spent working on homework. For the spreadsheet problems, the number of spreadsheets completed as well as the total points earned on homework was recorded for each student. Students whose number of multiple-choice questions completed was greater than 155, or whose time spent answering multiple-choice questions exceeded 74 minutes, and students whose points earned on spreadsheets turned in exceeded 39 were considered the group completing homework. All other students were considered the group who did not complete homework. Students were not aware that they were in an experiment; thus, there is no reason to believe there was any halo effect.

Results

In Table 1, column 2, we provide the results from the ANOVA using total points earned as the dependent variable. There was a marginally significant ($p < 0.15$) main effect for class. From Table 2, which provides ANOVA summary statistics for each factor, it is evident that the mean total exam points earned was higher for the long classes than for the short class (300.940 versus 283.828). This result is consistent with the alternative hypothesis that students in the long classes earned more total points than students in the short class. Major and past achievement were significant factors ($p < .01$) in explaining the variation in total points earned. The data in Table 2 also indicate that the mean total points earned was higher for accounting majors and for students with a high cumulative GPA. These findings are consistent with Ha3 and Ha4. In Table 1, column 2, there are no significant second-order interactions and no main effect for gender.

Table 1, column 3, provides the results from the ANOVA model using the total points earned on problems as the performance measure. These results reinforce those in column 2, using total exam points earned as the dependent variable. There were significant main effects for class, major, and past achievement. The main effect for gender and all second-order interactions were insignificant. The data in Table 2

TABLE 1. ANOVA Results[a]

Dependent variable		Total exam points earned[b]		Total points earned on exam problems[c]		Total points earned on exam multiple-choice questions[d]	
Source	*df*	Mean square	*F* ratio	Mean square	*F* ratio	Mean square	*F* ratio
Class	1	6,293.163	1.993*	4,286.829	7.694****	191.980	0.151
Gender	1	2,837.072	0.899	103.248	0.185	1,857.872	1.461
Major	1	28,514.030	9.031****	5,495.492	9.864****	8,973.647	7.057****
Past achievement (GPA)	1	84,588.125	26.790****	15,127.133	27.151****	28,172.946	22.155****
Class × Gender	1	6.025	0.002	189.999	0.341	128.356	0.101
Class × Major	1	106.140	0.034	107.956	0.194	428.199	0.337
Class × Achievement	1	57.705	0.018	5.792	0.010	26.924	0.021
Gender × Major	1	564.668	0.179	502.714	0.902	1.802	0.001
Gender × Achievement	1	1,322.216	0.419	405.698	0.728	263.091	0.207
Major × Achievement	1	46.476	0.015	32.860	0.059	1.175	0.001
Residual	101	3,157.469		557.145		1,271.643	
Adj. Total	111						

[a]Each factor took on two levels. Cumulative GPA was used to classify students into high or low achievement groups. Second-order interactions were included in the model; higher-order interactions were ignored. [b]This column provides the ANOVA results using total points earned on all four exams as the dependent measure of performance. Four factors were included in this analysis: class, gender, major, and past achievement. [c]This column provides the ANOVA results using the points earned on exam problems as the dependent measure of performance.Four factors were included in this analysis: class, gender, major, and past achievement. [d]This column provides the ANOVA results using the points earned on multiple-choice questions as the dependent measure of performance. Four factors were included in this analysis: class, gender, major, and past achievement.
*probability < .15.
**probability < .10.
***probability < .05.
****probability < .01.

TABLE 2. Summary Statistics From ANOVA Mean Performance Measures for Each Factor

Factor	Level	Total exam points (*M*)	Points on exam problems (*M*)	Points on exam multiple-choice questions (*M*)	*N*
Class	Long	300.940	123.434	177.506	83
	Short	283.828	109.310	174.517	29
Gender	Female	291.776	119.469	172.306	49
	Male	300.190	120.016	180.175	63
Major	Nonaccounting	286.587	115.225	171.363	80
	Accounting	321.312	131.156	190.156	32
Achievement	GPA ≥ 2.7	331.896	135.000	196.896	48
	GPA < 2.7	269.969	108.359	161.609	64

Note. This table provides mean performance measures for each factor-level combination obtained from the ANOVA. Three performance measures are presented: total points earned on all four exams, points earned on exam problems, and points earned on exam multiple-choice questions. The four factors included in the model are class, gender, major, and past achievement. Each factor took on two levels. Cumulative GPA was used to classify students into high and low achievement groups.

indicate that the mean points earned on problems was higher for students in the long class, accounting majors, and students of high past achievement. Thus, the results using points earned on problems are consistent with the alternative hypothesis that students in the long class, accounting majors, and students with a high cumulative GPA perform better.

The ANOVA results using points earned on multiple-choice questions are given in column 4 in Table 1. There are significant main effects ($p < .01$) for major and past achievement. In contrast to column 3, class was no longer a significant factor. The data in Table 2 show that students in the short and long class performed at about the same level on multiple-choice questions. This finding supports the hypothesis that the difference in performance between students in the short and long class results from learning how to solve longer exercises and problems, not from learning how to solve multiple-choice questions. Therefore, the marginally significant effect of class for total points earned (column 2, Table 1) is due to the difference in performance on the longer problems.

Thus, after controlling for past achievement, gender, and major, the results indicate that there was a significant main effect for class length when the total exam points earned and the points earned on exam problems were analyzed. However, this main effect was no longer significant when the points earned on multiple-choice questions were examined. These findings support the notion that a longer class length is needed for students to be able to learn how to solve complicated management accounting problems effec-

tively. As expected, there were significant main effects for past achievement and major across all three performance measures. Students with a high cumulative grade point average and students majoring in accounting performed better than their counterparts.

Table 3 provides the MANOVA results. Each hypothesis of no overall effect was tested with four test statistics: Wilks' Lambda, Pillai's Trace, Hotelling-Lawley Trace, and Roy's Greatest Root. Because the four test statistics resulted in identical F approximations, the data in Table 4 provide only the value and F approximation for the Wilks' Lambda statistics.

The hypothesis of no overall class effect is rejected at $p < .10$ by all four statistics. Similarly, there was a significant effect for major ($p < .10$) and past achievement ($p < .01$). The hypothesis of no overall gender effect cannot be rejected at conventional levels. Additionally, all second-order interactions were insignificant. Overall, the MANOVA results support the conclusions from the ANOVA results presented in Tables 1 and 2.

TABLE 3. MANOVA Results

Source	Wilks' Lambda	*F* Approximation
Class	0.953	2.465**
Gender	0.964	1.873
Major	0.950	2.613**
Past achievement (GPA)	0.875	7.115****
Class × Gender	0.986	0.688
Class × Major	0.972	1.414
Class × Achievement	0.999	0.028
Gender × Major	0.975	1.298
Gender × Achievement	0.991	0.454
Major × Achievement	0.999	0.063

Note. This table provides the MANOVA results using three dependent measures of performance: total points earned, total points earned on problems, and total points earned on multiple-choice questions. Four factors were included in this analysis: class, gender, major, and past achievement. Each factor took on two levels. Cumulative GPA was used to classify students into high and low achievement groups. Second-order interactions were included in the model; higher-order interactions were ignored. This table provides the Wilks' Lambda and the *F* approximation for the null hypothesis of no overall effect.
*probability < .15.
**probability < .10.
***probability < .05.
****probability < .01.

For each class, the mean performance of those students consistently completing homework was compared with performance of those students who did not (see Table 4). Across all three performance measures, students who consistently completed homework performed better than those who did not for both class lengths. These findings are consistent with Hypothesis 5a and indicate that homework is an effective means for students to learn accounting.

Limitations

Results from the study showed that students who consistently complete homework perform better on examinations. This may have less to do with the homework itself and more to do with the possibility that, to begin with, such students are more intelligent and more interested in the course than those who do not consistently complete homework. Also, classes were taught by different instructors, and there were some differences in scheduling. These factors could have effects not analyzed in the statistical tests.

Conclusions

In this study, I examined two factors that can affect students' learning of accounting: length of classroom time and homework completion. It hypothesized that length of learning affects how well students perform. After controlling for gender, past achievement, and

TABLE 4. Test for Differences in Means in Performance Measures on the Basis of Homework Completion

	Short class			Long class		
Performance measure	Completed homework	Did not complete homework	*T* statistic	Completed homework	Did not complete homework	*T* statistic
Total points (*M*)	296.929	271.600	1.415**	319.478	277.892	2.770****
Points on problems (*M*)	113.929	105.000	1.068*	131.978	112.811	3.081****
Points on multiple-choice questions (*M*)	183.000	166.600	1.499**	187.500	165.081	2.399****

Note. This table provides the test of difference between mean performance measures of students who consistently completed homework and those who did not. This analysis was performed separately for each class length. Three specifications of the performance measure were examined: total points earned on all four exams, points earned on exam problems, and points earned on exam multiple-choice questions.
*one-tailed probability < .15.
**one-tailed probability < .10.
***one-tailed probability < .05.
****one-tailed probability < .01.

major, I found that students in the long class performed better overall and, specifically, better on exam problems, than students in the short class. However, there was no significant main effect for class length when the points earned on multiple-choice questions were analyzed. Across all three performance measures, there were significant main effects for achievement and major; students with a high cumulative GPA and accounting majors performed better than their counterparts. The results also indicate that students who consistently completed homework performed better than those who did not for each class length. Thus, administrators of accounting programs should consider the consequences of reducing classroom time. Further, accounting instructors should institute procedures that will encourage students to complete homework consistently to maximize their students' learning of accounting.

NOTES

1. Because the data are unbalanced, the method of least squares was used to fit the general linear models.

2. The models were also estimated using a continuous variable for achievement. The results are qualitatively similar and are not reported.

3. To prevent disclosure of examination questions, data in the exam problems were changed. Special attention was given to keeping the same level of difficulty between exams.

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