

# Exam Time Usage in Accounting Courses and Student Exam Performance

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*The study examines the relationship between student time usage during accounting exams and their exam performance. The results show that exam time usage does not have a significant impact on accounting student exam performance. However, the current study provides evidence that GPA has a significant effect on accounting student exam performance. In addition, the current study examines the possible factors that may affect a student's decision in the length of the exam time. The results also show that GPA and whether students have taken high school accounting courses are two significant factors: Students with a better GPA and/or students who have had high school accounting courses are likely to use more exam time than their peers.*

*Keywords: exam time usage, exam performance, high school accounting education, GPA*

## INTRODUCTION

Recent decades saw a veritable flood of research on accounting education and various discussions on improving student accounting course learning performance (Phillips & Schmidt, 2010; Turner, 2006), especially the research focusing on the first college-level financial accounting course (Rankin et al., 2003; Uyar, & Güngörmüş, 2011). The majority of the extant research focuses on factors affecting accounting course performance. For example, a student's SAT score and their math background (Eskew & Faley, 1988), prior experiences with high school accounting (Xiang & Gruber, 2012), and advice provided by prior students to subsequent students (Xiang, 2016). Extant research also provides evidence on a business major student's accounting major decision after taking accounting courses (Geiger & Ogilby, 2000) and a student's decision to retake accounting courses (Baldwin, et al., 1989). In addition, there is a large quantity of research that studies the impact of student experiences with prior accounting courses on their following accounting courses' learning performance (Doran & Bouillon, 1991). Although there has been much discussion related to accounting education (especially the first post-secondary financial accounting course), many purely focus on the course content or the course itself. In other words, very limited extant studies focus on the effect of exam length and related factors on accounting student exam performance. Lee et. al (2014) is one exception in that they examine exam length as a whole to explore whether it can be shortened. They find that exam length can be shortened by one hour, providing more lecture time and alleviating students' stress level. The main difference between the two studies is that, as mentioned before, Lee et. al (2014) study the exam length as a whole while the current study focuses more on the exam time usage by accounting students. The current study aims to examine the impact of accounting student time usage on their exam performance within accounting course(s) when considering cognitive fatigue.

One main extant study of which this study follows the steps is Jensen, Berry, and Kummer (2013). Using data collected from undergraduate biology students, they study exam fatigue and exam length on student exam performance. Their results show that lengthier exams do not result in poor exam performance due to cognitive fatigue. Instead, there is a positive relationship between lengthier exams and exam performance: Lengthier exams lead to better exam performance.

The data used in the study was collected from a group of accounting master students studying at a Midwest public university. In the study, some general information such as gender and race, whether the students have prior experience with accounting, and their GPA are included in the model. The results show that there is no significant evidence that student exam time usage has a significant effect on their exam performance. However, some factors, such as GPA, show a significant impact on a student's exam performance. In addition, the study includes a new model to examine possible factors that significantly impact exam time usage. It shows that two factors are significant here: GPA and prior high school accounting experience. Both factors are positively and significantly related to student exam time usage. Specifically, students with higher GPAs tend to use more time during accounting exams. Similarly, students who have had prior high school accounting experience are likely to spend more time completing the exam.

The current paper contributes to the literature in the following ways: First, to the best of my knowledge, this study is the first to examine the relationship between exam time usage (recognition fatigue) and student exam performance. As mentioned before, much extant research focuses on the accounting course or the course content itself, with very limited extant studies focusing on factors such as exam time usage or related psychological point of view. Second, while most prior studies use undergraduate students as the focus group (Xiang & Gruber, 2012), this study focuses mainly on graduate accounting students. The study also includes undergraduate students in the robustness section to make the results more persuasive. Third, unlike the majority extant research focusing only on financial accounting course(s), the current study includes governmental accounting and financial accounting (the latter in the robustness check) when proving the relationship between exam length and exam performance.

The content of the study is designed as follows: Section Two reviews relevant literature and develops testable hypotheses. Section Three describes the research models. Section Four introduces the university and the sample used. Section Five presents the empirical results. Section Six runs additional robustness tests. Section Seven concludes.

## **LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT**

### **Factors Affecting Student Learning Performance in Accounting Courses**

Doran and Bouillon (1991) find that gender and student intentions to major in accounting are two key factors that affect student learning performance in the first college-level accounting course. Kukreja (2013) agrees with the results by showing that student intention in some areas (e.g., accounting and finance) can be an important factor in explaining learning performance in the first few financial accounting courses.

Extant studies provide evidence that a student's prior academic performance, such as SAT scores and/or math skill, impacts their learning performance in accounting courses. As early as 1963, Dewey presented that a student's prior academic experience (SAT, for example) is significant in explaining their learning performance in college-level accounting courses. In 1988, Eskew and Faley studied the possible determinants of student learning performance in the first financial accounting course. Their results show that some factors are important in explaining student learning performance: 1). A student's prior academic performance, such as SAT scores or GPA in high school or college; 2). A student's academic performance in courses such as math or statistics; 3). A student's prior experience with accounting in high school; and 4). A student's learning attitude or motivation, such as whether assignments have deadlines. Following their steps, many studies have focused on discussing the determinants of student learning performance in accounting courses (Doran & Bouillon, 1991; Gist et al., 1996). For example, Uyar and Güngörmüş (2011) showed that student GPA and math performance are the most prominent key factors impacting student learning performance in the first college-level accounting course. Kukreja (2013) also includes GPA in his study, and the results are consistent with those of Uyar and Güngörmüş (2011). In addition, Kukreja (2013)

provided evidence that student learning performance in the first post-secondary accounting course can significantly impact their learning performance in subsequent accounting courses, such as Intermediate Accounting.

There is also constant discussion about the effect of high school accounting learning experience on student course performance in college-level accounting courses. According to Baldwin and Howe (1982), prior high school accounting education does not significantly affect student learning performance in the first college-level accounting course. Or, as they presented, prior high school accounting learning experience is, at some degree, not an important factor in explaining student accounting course performance at the university level. However, Keef and Hooper (1991) argued that prior accounting learning experience affects subsequent learning performance in college-level accounting courses. Xiang and Gruber (2012) find evidence to support Keef and Hooper (1991) by focusing exclusively on the impact of the prior accounting learning experience. They show that prior high school accounting experience has a positive and significant effect on student course performance in subsequent college courses. However, they warned, the impact has to be interpreted carefully as it is not a simple linear relationship: Prior accounting learning experience is not a panacea, nor can it be used to guarantee an A-grade. Instead, prior high school accounting education helps prevent students from failing the course. Xiang and Gruber (2012) also discussed that other factors, such as student motivation (e.g., class attendance, assignments submission), are important determinants of student learning performance in college-level accounting courses.

### **Exam Length, Recognition Fatigue, and Student Performance**

Ackerman and Kanfer (2009) studied more than 200 first-year college students who were invited to complete three sessions of tests with different lengths. They found that recognition fatigue increases as the exam length increases. They also find that average exam performance is better for students with lengthier tests than those with shorter exams. In addition, they provide evidence that individual differences (for example, personality, motivation, and interest) play a more significant role in student exam performance. Following their strategy, Jensen, et al. (2013) collected data from undergraduate biology students and studied their exam length, recognition fatigue, and course/exam performance. Their results show that a lengthier exam generally leads to better performance despite recognition fatigue.

Given that exam length impacts student performance of course topics or exam performance, the current study predicts that exam length that accounting students use in the exam affects their performance. Hence, the hypothesis of the current study is:

*H1: The exam length (the length of exam time usage) is positively related to student performance in accounting courses.*

## **METHODOLOGY**

### **Sample and Participants**

All data used in the current study are collected from a public university in the American Midwest. With an enrollment of over 11,000, the university is known for its academic, arts, and athletic excellence. It offers nearly fifty undergraduate programs and over ten graduate degree programs. Its College of Business & Economics has been accredited by the Association to Advance Collegiate Schools of Business (AACSB) and can provide doctoral (DBA), master, and bachelor's degrees. The accounting program in the college is the largest one, which provides both bachelor's degrees and master's degrees (Master of Professional Accountancy, MPA).

The data used in the study were collected from the MPA students taking Governmental and Not-for-Profit Accounting. Two sections were provided in the semester. Each section was with about 40 students. Three main exams, several projects, and some other assignments/quizzes were combined to assess the student's learning performance.<sup>1</sup> There were 68 students registered for the course, and 42 students were included in the study.<sup>2</sup>

## Research Model

Following the study of Xiang and Gruber (2012), to test the hypotheses, simple linear regression is used to assess student exam/learning performance. The regression model used is:

$$Exam_i = \alpha + \beta_1 Year\_In\_School_i + \beta_2 Gender_i + \beta_3 With\_High\_School\_Accounting\_Course_i + \beta_4 GPA_i + \beta_5 Exam\_Time_i + \varepsilon_i \quad (1)$$

where the dependent variable Exam is a continuous one based on the total points a student earned from the exam of the master-level Governmental and Not-for-Profit course. The independent variables are Year\_in\_School, Gender, With\_High\_School\_Accounting\_Course, GPA, and Exam-Length. Year\_in\_School takes the value of from one to five (1 freshman; 2 sophomore; 3 junior; 4 senior; & 5 graduate). Gender is a dummy variable taking the value one if male student, and zero otherwise. With\_High\_School\_Accounting\_Course is a dummy variable taking the value one if the student had taken an accounting course in high school, and zero otherwise. GPA refers to the cumulative college grade-point-average (4.0 scale) information when taking the survey. And Exam\_Time is a continuous variable in minutes the student used in one exam.

## DATA ANALYSES AND RESULTS

Table 1 presents the general statistical information about the graduate students included in the current study. Table 1 shows that more than half students are male students, and the majority of the students examined are white. Over 2/3 of the examined graduate accounting students had taken accounting course(s) in high school. On average, the GPA of the students is 3.5. The range of the average exam points for the tested semester is 72-82 points. The range of average minutes a student uses in a midterm/final exam is 55-74 minutes.

**TABLE 1**  
**DESCRIPTION OF SAMPLE ( $n = 42$ )**

Panel A: Discrete Variables		
	<i>n</i>	%
Gender		
Male	27	64.29%
Female	15	35.71%
Race		
White	39	92.86%
Minorities	3	7.14%
High School Accounting Course		
Yes	33	78.57%
No	9	21.43%
Panel B: Continuous or Quasi-Continuous Variables		
	Mean	SD
GPA	3.50	0.21
Exam Score		
Exam 1	73.90	9.82
Exam 2	72.90	13.75
Exam 3	81.09	8.42
Exam Time		
Exam 1_Time	71.23	8.84
Exam 2_Time	73.09	9.72
Exam 3_Time	55.75	10.73

Table 2 shows the correlation results of the key variables included in the study. The correlation results show a positive and significant relationship (at the 1% level) between the students' exams and GPA. Table 2 also shows that there are multi-collegial relationships among various factors. For example, Gender and Race are negatively and significantly (at the 1% level) related to each other. Therefore, more multi-variation analysis would be necessary.

Table 3 shows the OLS regression results. There are three columns, and the dependent variable is the exam points a student scored in one midterm exam. The results in Table 3 show that GPA is a factor that has a significant effect (at the 1% level) on exam points, and it carries a significant signal (at the 1% level) consistent among all three exams in the tested semester. However, the number of minutes the student uses in the mid-term does not show any significant signal in any of the three columns. Hence, Hypothesis 1 is not supported.

**TABLE 2**  
**CORRELATION MATRIX OF VARIABLES**

	Exam 1	Exam 2	Exam 3	GENDER	RACE	HIGH SCHOOL ACCOUNTING COURSE	GPA	Exam 1_Time	Exam 2_Time
Exam 2	0.574***								
Exam 3	0.415***	0.562***							
GENDER	0.300*	0.114	0.149						
RACE	0.002	-0.180	-0.065	-0.366**					
HIGH_SCHOOL_ACCOUNTING_COURSE	-0.088	-0.144	-0.335**	0.239	-0.181				
GPA	-0.438**	0.588**	0.417**	-0.005	-0.003	-0.145			
Exam 1_Time	0.073	0.080	0.155	-0.170	0.141	0.167	0.255***		
Exam 2_Time	0.212	0.210	0.203	0.072	-0.146	0.177	0.299*	0.546***	
Exam3_Time	-0.007	-0.063	-0.163	0.155	-0.112	0.337	-0.075	0.159	0.283*

**TABLE 3**  
**OLS REGRESSION \_EXAM PERFORMANCE**

Variable	(1) Exam_1	(2) Exam_2	(3) Exam_3
GENDER	7.015 (3.803)*	2.218 (4.401)	6.846 (2.932)**
Race	-0.576 (2.432)	-4.930 (2.922)	-2.618 (1.879)
HIGH_SCHOOL_ACCOUNTING_COURSE	1.737 (5.065)	-7.217 (5.808)	-6.954 (4.501)*
GPA	24.421 (8.384)***	32.341 (10.009)***	15.785 (6.079)**
Exam_1_Time	-0.132 (0.205)		
Exam_2_Time		0.198 (0.232)	
Exam_3_Time			-0.762 (0.318)
Intercept	0.001	0.001	0.001
Number of Observations	42	42	42
R <sup>2</sup>	0.34	0.49	0.46

\*\*\*, \*\*, and \* indicate statistical significance at the 0.01, 0.05, or 0.10 level, respectively.

The results in Table 4 show the key factors that have a significant impact on the length of time one student uses in one midterm exam. The results provide evidence that two significant factors explain the number of minutes a student would use in the exam: GPA and whether they had an accounting education in high school. Both factors are significant in all three columns though the significance level varies from 1% to 10%. It shows that students with higher GPAs will likely use more exam time than their peers when controlling other factors. Similarly, Table 4 also provides evidence that students that had taken pre-college accounting course(s) are likely to use more exam time during their accounting exam(s). This may be because students who took a high school accounting course are more likely to be students planning to major in accounting and, hence, are eager to perform well in accounting course(s). It is not surprising that they have a better study attitude and, hence, tend to be more careful, which means a longer time, when taking the exam(s).

**TABLE 4**  
**OLS REGRESSION\_EXAM TIME**

Variable	(1) Exam_1_Time	(2) Exam_2_Time	(3) Exam_3_Time
GENDER	-2.325 (3.526)	01.126 (3.698)	1.164 (4.642)
Race	-0.749 (2.269)	-3.377 (2.369)	0.852 (2.973)
HIGH_SCHOOL_ACCOUNTING_COURSE	9.181 (4.393)**	8.488 (4.597)*	13.421 (5.769)**
GPA	14.868 (7.296)**	17.707 (7.677)**	-0.460 (9.634)
Intercept	0.01	0.01	0.02
Number of Observations	42	42	42
R <sup>2</sup>	0.21	0.29	0.21

\*\*\*, \*\*, and \* indicate statistical significance at the 0.01, 0.05, or 0.10 level, respectively.

### ROBUSTNESS TESTS

To provide more confidence to the results provided in the main results section, a robustness test is done in this section. The samples of the robustness test are from a group of undergraduate financial accounting students. The robustness results are reported in Table 5. The results in Table 5 are consistent with the basic results reported in Table 3 and Table 4: There is no evidence that exam time usage is a key factor in explaining accounting student exam performance. However, similar to Table 3, GPA still carries a positive and significant signal (at the 1% or 10% level) in all three regressions. Hence, the robustness tests provide more evidence that the basic results are not out of track. It also boosts the confidence of the basic results reported before.

**TABLE 5**  
**ROBUSTNESS TEST**

Variable	(1) Exam 1	(2) Exam 2	(3) Exam 3
GENDER	22.996 (8.807)	-0.823 (3.290)	9.406 (8.698)
Race	5.451 (4.240)	-1.361 (1.343)	-1.067 (4.130)
HIGH_SCHOOL_ACCOUNTING_COURSE	-2.199 (6.232)	0.909 (2.243)	3.911 (6.168)



GPA	16.796 (9.978)*	29.013 (3.426)***	20.439 (9.781)*
Exam_1_Time	-0.076 (0.336)		
Exam_2_Time		0.100 (0.140)	
Exam_3_Time			-0.003 (0.249)
Intercept	0.001	0.001	0.001
Number of Observations	20	42	42
R <sup>2</sup>	0.49	0.47	0.49

\*\*\*, \*\*, and \* indicate statistical significance at the 0.01, 0.05, or 0.10 level, respectively.

## DISCUSSION AND CONCLUSIONS

Because there is very limited prior research examining the impact of accounting student time usage on their exam performance, the current study aims to fill this gap. The author uses samples from a Midwest public university to examine the students' exam usage in their midterm/final exams and their exam performance. There is no significant evidence that the exam length used by the students has a significant effect on their exam performance. However, the results show that GPA is a key factor in explaining a student's performance in exams. In addition, the results show that two factors play an important role in explaining the length of time accounting students use in their exams: GPA & whether they possess prior accounting experience from high school. The results also show that the students with better GPAs and/or the students who have taken accounting course(s) in high school are likely to spend more time on their exams.

The current study has significant contributions to the extant research area in accounting education by filling the gap in the related topic. However, I have to admit that there are some limitations to the study itself. One problem is that the study focused on one accounting course. Whether the results can be extended to other accounting course(s) or even to other majors, I have no methods to tell so far. Another problem is that there may be many factors related to student exam-taking behavior, such as exam time usage. For example, a student's personality, family-related reason(s), and possible accidents happening just before the exam may have some negative effect on student exam-taking behavior or exam performance. However, I have no data or available information to test those factors and would leave those topics to future research.

## REFERENCES

- Ackerman, P.L., & Kanfer, R. (2009). Test length and cognitive fatigue: An empirical examination of effects on performance and test-taker reactions. *Journal of Experimental Psychology: Applied*, 15(2), 163.
- Baldwin, B.A., & Howe, K.R. (1982). Secondary-level study of accounting and subsequent performance in the first college course. *The Accounting Review*, 57(3), 619–626.
- Baldwin, B.A., Hansen, D.A., Howe, K.R., & Wasson, D.D. (1989). Repeating the first college-level accounting course: Empirical evidence from four institutions. *Journal of Accounting Education*, 7(1), 9–23.
- Dewey, J. (1963). *Experience and Education*. New York. Collier Books.

- Doran, B.M., & Bouillon, M.L. (1991). Determinants of student performance in accounting principles I and II. *Issues in Accounting Education*, 6(1), 74–84.
- Eskew, R.K., & Faley, R.H. (1988). Some determinants of student performance in the first college-level financial accounting course. *The Accounting Review*, 63(1), 137–147.
- Geiger, M.A., & Ogilby, S.M. (2000). The first course in accounting: Students' perceptions and their effect on the decision to major in accounting. *Journal of Accounting Education*, 18(2), 63–78.
- Gist, W.E., Goedde, H., & Ward, B.H. (1996). The influence of mathematical skills and other factors on minority student performance in principles of accounting. *Issues in Accounting Education*, 11(1), 49–60.
- Jensen, J.L., Berry, D.A., & Kummer, T.A. (2013). Investigating the effects of exam length on performance and cognitive fatigue. *PloS One*, 8(8), e70270.
- Keef, S.P., & Hooper, K.C. (1991). Prior accounting education and performance in a first-level university course in New Zealand. *Accounting & Finance*, 31(1), 85–91.
- Kukreja, G. (2013). The determinants of students' performance in Introductory Accounting courses: Evidence from Kingdom of Bahrain. *Journal of Emerging Issues in Economics, Finance and Banking*, 3(1), 183–201.
- Lee, E.S., Bygrave, C., Mahar, J., Garg, N., & Cottreau, S. (2014). Can exams be shortened? Using a new empirical approach to test in finance courses. *International Journal of Educational and Pedagogical Sciences*, 8(1), 110–120.
- Phillips, F., & Schmidt, R.N. (2010). Creating early success in financial accounting: Improving performance on adjusting journal entries. *Accounting Perspectives*, 9(2), 87–96.
- Rankin, M., Silvester, M., Vallely, M., & Wyatt, A. (2003). An analysis of the implications of diversity for students' first level accounting performance. *Accounting & Finance*, 43(3), 365–393.
- Turner, L.E. (2006). Learning from accounting history: Will we get it right this time? *Issues in Accounting Education*, 21(4), 383–407.
- Uyar, A., & Güngörmüş, A.H. (2011). Factors associated with student performance in financial accounting course. *European Journal of Economic & Political Studies*, 4(2), 139–154.
- Xiang, M. (2016). Improving the quality of learning in accounting through advice and learning experiences from former students. *Advances in Accounting Education*, 18, 1–22.
- Xiang, M., & Gruber, R. (2012). Student performance in their first post-secondary accounting course: Does high school accounting matter? *Advances in Accounting Education*, 13, 297–311.

## APPENDIX: VARIABLE DESCRIPTION

Variable Name	Description
Exam_1_Time	The number of minutes a student spent in the 1 <sup>st</sup> mid-term exam
Exam_2_Time	The number of minutes a student spent in the 2 <sup>nd</sup> mid-term exam
Exam_3_Time	The number of minutes a student spent in the final exam
Gender	Gender: 1=male; 0=female
Race	Race: 1=white; 0=minorities
With_High_School_Accounting_Course	Whether the student had a high school accounting course: 1=yes; 0=no
GPA	Cumulative college grade-point-average (4.0 scale) information when taking the first university-level accounting course
Exam_1	A student's grade (in points) in the 1 <sup>st</sup> mid-term exam
Exam_2	A student's grade (in points) in the 2 <sup>nd</sup> mid-term exam
Exam_3	A student's grade (in points) in the final exam